

A STUDY OF FACTORS CONTRIBUTING TO
EDUCATIONAL ADVANTAGE/DISADVANTAGE IN
THE MALAYSIAN CONTEXT

A Thesis

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by

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PREFACE

Many writers have attempted to account for educational problems of Malaysia from a historical approach. One of these problems is educational disadvantage. Few writers have however, examined this problem in research studies. Thus, there is a need for research studies to identify , systematically, factors which contribute to educational disadvantage in Malaysia, and through this thesis, the writer attempts to do exactly this.

Because Malaysia is progressing towards modern technology, its relationship to educational disadvantage is therefore likely to be significant. Further, it also seems clear that to achieve success in a modern technological state, appropriate attitudes to work and habits of work are also likely to be essential, and a knowledge of these technological subjects is of course vital. For these reasons, the aims of this study are, to investigate what factors operate to produce educational advantage and disadvantage in Malaysia, and, to explore the factors which relate to the need for achievement in Malaysian school pupils.

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ABSTRACT OF THE THESIS"A STUDY OF FACTORS CONTRIBUTING TO EDUCATIONAL ADVANTAGE/DISADVANTAGE
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A Statement of the Problem and its Importance

An important area of educational concern all over the world is the problem of educational disadvantage. It represents not only an important aspect of inequality of opportunity, but also a cause of social injustice. This is no less true in Malaysia where increasingly, attention has been directed to ways of ameliorating this problem.

This research study concentrates on the above problem. It attempts to examine factors considered important in contributing to educational advantage and disadvantage in Malaysia. It does this by testing the relationship of certain variables to success or failure in the Lower Certificate of Education (LCE), in particular, in the technologically important subjects of Science and Mathematics. An attempt is also made to explore the relationship of need-achievement factors to success or failure in LCE, and hence in educational advantage/disadvantage.

Method and Procedure

The sample consisted of 1 374 third formers in English medium secondary schools in Klang, Malaysia. Both boys and girls of the three racial groups were included.

The survey instruments included teachers' ratings of the socio-economic status and need-achievement of pupils, a questionnaire, a need-achievement test, a job-values inventory, and LCE results published by the Ministry of Education, Malaysia.

The chi-square test of significance was used in the testing of some thirty hypotheses, using a severe level of significance to minimize errors in rejecting or accepting the null hypotheses. Many combinations of relationships between variables were also examined by

chi-square for exploratory purposes. Finally, the Automatic Interaction Detection (AID) technique was used to identify predictor variables which explained best the variance in criterion variables.

Summary of Major Findings

Results of analyses showed that many factors operate to produce educational advantage/disadvantage in Malaysia, the chief being socio-economic. These factors also combined to produce an important mediatory factor - need-achievement, which affects success or failure in LCE. The most important component of need-achievement is, however, the actual striving sub-factor. The ideological component is less important.

Racial differences in these two components of need-achievement are obvious. Malay pupils tend to show a higher acceptance of the ideology of achievement than the Chinese or the Indians, but, as measured by teachers' ratings, they tend to strive less hard in practice than the Chinese. Thus, different racial groups showed different degrees of success in LCE. The Chinese tend to achieve better LCE grades than the Malays or the Indians.

There are also many interactions between predictor variables to produce a combined effect on criterion variables. This is best shown by the "trees" of educational advantage/disadvantage developed through the technique of AID analysis. The non-symmetrical shape of the tree shows clearly the interaction between the variables at each branch.

These results point to the conclusion that if one is from a home of high socio-economic status, one is more likely to obtain educational advantage than one who comes from a low socio-economic status home.

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CHAPTER I

THE PROBLEM

INTRODUCTION TO THE PROBLEM

Malaysia is a South-East Asian country which shares both the cultures of the traditional East and the modern West. In regard to western culture, its main interest is in removing the relative disadvantage with respect to material well-being that it has inherited from its pre-colonial and colonial days, and in becoming a modern technological state. Thus, the Malaysian government has adopted the free-enterprise model of economy, together with a meritocratic technological approach to occupational status and rewards.

One of the significant problems of western technological societies is the existence and persistence, in a relatively prosperous state, of groups of people who are economically disadvantaged. These are mainly the lower socio-economic group, racial, ethnic and religious minority groups, and women as a whole. The existence of such disadvantage not only contradicts the principle of meritocratic selection for occupation, but also offends the United Nations' Charter of Human Rights concerning equal opportunity for all, to which most nations have subscribed. Further, it represents a serious source of social injustice which could all too easily give rise to social disorder.

One of the aspects of economic disadvantage which has been closely examined during the last 20 years or so is the close connection to be found between economic disadvantage and educational disadvantage. This has arisen from the existence, in a meritocratic state, of numerous alternative channels of mobility available to all who have the intellectual ability, the drive and the enterprise to take advantage of them. The main channel is that offered by higher education. Advanced education provides the opportunity for access to high level occupations with their related rewards of status and high income. In particular, the professions, law, medicine, engineering, the technological occupations, managerial and administrative occupations form the key occupational groups. In developing countries, many of these are based on a good foundation of education in mathematics and science, and a variety of related subjects, but all require an extended education.

Selection tends to occur at certain levels of this extended education so that some persons continue while others drop out. Several of these selection points at which entry to higher education is determined, have become criterion points in respect of later advancement or failure to advance to higher occupational status and advantage. For the Malaysian educational system, the first and the most crucial point occurs at the end of third form of secondary school education, at which level pupils sit the Lower Certificate of Education examination (L.C.E.).

Entry to the fourth form is dependent on the success in L.C.E. and is of course the basic prerequisite for an extended secondary education which in turn facilitates entry to higher and tertiary education. In a real sense, therefore, success in L.C.E. is a criterion variable which relates closely to later economic and occupational advantage. Thus, one of the causes of economic disadvantage may well accrue from educational disadvantage.

The immediate question raised is what factors contribute to success or failure in education? Failure to achieve well in education is due to two main groups of factors:

1. Natural factors or physiological deficiencies -
e.g. physical handicaps, low I.Q., malnutrition, and other physical defects which impair learning efficiency, in which little could be done other than special attention accorded to their disadvantage.
2. Socially and culturally produced factors -
which can prevent the child from making adequate progress in education, thus inhibiting him from seizing the opportunity to take advantage of education. Since these factors are socially and culturally produced, the trend in western states is to remove these disadvantages. This is well illustrated by the American interest shown in Coleman's ¹ classic

¹. Coleman, J.S. et al., Equality of Educational Opportunity
Washington, D.C., U.S. Government Printing Office, 1966.

study on Equality of Opportunity.

STATEMENT OF THE PROBLEM SITUATION IN MALAYSIA

Malaysia has accepted the principle of adequate education for all and as a natural right of her citizens, and also as a necessary step to achieving a technological society which can provide an adequate standard of living for all. In this, it has extended both primary and secondary education vigorously. It has attempted to instill in its people the advantages and disadvantages of an extended education, and the value of studying hard and doing well, both in educational and in socio-economic terms. It has accepted that under colonial rule, some of its racial groups had become educationally and hence economically disadvantaged so that racial and socio-economic imbalance in educational, occupational and socio-economic status has developed. Hence, in the last 15 years or so, Malaysia has adopted both vigorous propaganda and administrative measures to right the imbalances.

The question arises as to how far these measures have succeeded in reducing the educational and economic disadvantage suffered by certain groups of her citizens. To what extent does educational disadvantage occur in Malaysia? What groups are most affected? What factors operate to produce them?

THE SCOPE OF THE PROBLEM

Educational disadvantage is likely to occur at any level, in fact at all levels in the educational system, so that it is essential to reduce the scope of the investigation to manageable size. Essentially, this means reducing any investigation to a single educational level.

To obtain the most powerful information, it is important to select a crucial level of education for investigation. In the Malaysian system, there are three main crucial levels at which selection for further education (particularly higher education which leads to higher occupational and socio-economic advantage) may occur. These are:

1. At end of Form III - Failure in L.C.E. results in failure to enter form IV, and restricts almost completely the chance of further education and more advanced education.
2. At end of Form V - Success or failure in School Certificate determines entry to form six.
3. At end of Form VII (upper sixth) - Success or failure in the Higher School Certificate determines entry into University or moderately high level occupations.

Of the three, the first appears to be the most crucial 'cut-off' point, for after all, failure not only precludes any chance of further secondary education but also higher education.

For these reasons, the investigation is restricted to an investigation into the incidence, extent and nature of educational advantage/disadvantage at the end of the third form year. This enables success or failure in L.C.E. to serve as the criterion measure of educational advantage/disadvantage, since success in L.C.E. allows one to continue one's education, (if one so desires), to a higher level, and failure prevents one from doing so.

Assuming that native ability is normally distributed across all ethnic and social class groups, and across both sexes, then in a large sample of the various subgroups, and in the absence of social factors producing educational disadvantage, we would expect success in L.C.E. to be normally distributed in proportion to the populations of the subgroups. If, however, educational disadvantage is differentially distributed across all the groups, this should be reflected in corresponding changes in the proportion passing L.C.E. In this sense, L.C.E. is a criterion measure of related educational advantage/disadvantage.

Further, there have been severe imbalances in racial distribution of high level occupations, so that there occurs also the problem of Science/Mathematics disadvantage in relation to occupational disadvantage, and hence economic disadvantage as well.

The decision to take Science/Mathematics to a reasonably advanced level also occurs at the end of third form in Malaysia; those who pass L.C.E. at high level are also

placed in a Science class, whilst those obtaining lower L.C.E. levels tend to be placed in non-science classes. Thus, the L.C.E. Science/Mathematics result is also likely to be a criterion measure of advantage/disadvantage.

Finally, it is the belief of the writer that an important factor contributing to success in L.C.E. is a strong drive to succeed, that syndrome of psychological factors called need-achievement. Thus, a further problem is concerned with factors which contribute to need-achievement.

OBJECTIVES OF THE STUDY

The above discussion highlights three major research tasks:

1. Investigation into factors contributing to general educational advantage/disadvantage;
2. and to Science advantage/disadvantage;
3. factors contributing to the development of need achievement in Malaysian children.

These present a very large task for research. The writer intends to pursue it in detail in a Ph.D. research, so that much of this thesis is concerned with exploring the area, finding what factors appear to be important, what groups are affected, and what the likely chains of causality might be. Certain hypotheses will also be put forward and tested in this thesis, although the overall aim is essentially an exploratory one.

CHAPTER II

A REVIEW OF SELECTED LITERATUREINTRODUCTION

The literature on factors contributing to educational disadvantage and the relationship of need-achievement to these is of course enormous. It is not the intention to write an extensive review in the following chapter, although a number of research studies will be included in the bibliography. Instead, two works of immediate relevance will be examined in some detail. These include Coleman's Classic Study¹ on Equality of Opportunity, for this is not only a most extensive and significant study in educational disadvantage, but it has also provided the germ of ideas for this study; and the Dropout Study², which is the largest nationwide sociological study carried out by the Ministry of Education, Malaysia, and the only local study which is specifically on educational disadvantage.

1. Coleman, J.S. et al., Equality of Educational Opportunity. Washington D.C. U.S. Government Printing Office, 1966.

2. Dropout Study. Ministry of Education, Malaysia. Kuala Lumpur 1973.

COLEMAN'S STUDY

Coleman's study on equality of educational opportunity examines a great number of variables, (103 in all), believed to be contributing to educational disadvantage. He groups them broadly into pupil variables, teacher and school variables, and family background variables. Among these are two variables forming the watershed of this study - home background and motivation for achievement.

Coleman refers home background to a combination of many factors:

- parents' education,
- structural integrity of the home,
- number of siblings in the home,
- items in the home,
- reading material in the home,
- parent's educational desire and their interest in the child's education,
- foreign languages spoken in the home and
- urbanism of family background.

This home background forms a very useful and easily operationalised sociological index, which in this study was made even more comprehensive by building into it other variables of immediate relevance to Malaysian families and local conditions, e.g., the sanction systems practised in Malaysian families. Even the Dropout Study utilised Coleman's home background to form a parental advantage index which includes provisions in the home for the child,

like the adequacy and regularity of meals the child gets at home. This could be an important variable in many a developing country like Malaysia where children go to school hungry.

Still more important are pupil variables which Coleman found to show stronger association with achievement than do family background or school factors. The major variable in this category is motivation. These include the usual items like ambition, aspiration, realism, desire for education etc., but Coleman added two more aspects:

academic self concept regarding one's ability, and
one's sense of control over the environment and its related rewards.

Like many other research studies on achievement motivation which continue to expand on the already existing multi-dimensions of the achievement syndrome, Coleman, astonishingly enough, made no distinction between need-achievement ideology and need-achievement striving. In many ways, questions regarding one's ambition, aspiration, realism, willingness to postpone immediate gratification for future gains, and willingness to take risks, or beliefs about the virtue of hard work, etc. are questions regarding the ideology of achievement in modern living. What Coleman and many other researchers in the field of need-achievement have examined so far, is how well these ideologies of achievement have been learned. Little attention has been paid to how these ideologies are converted into habits in actual striving towards

achievement. It could well be that failure to convert the achievement ideology into practice is a factor contributing to the poor achievement of Negroes in America or the Maoris in New Zealand.

Thus, the present study extends the work of Coleman and other researchers on motivation by making a clear distinction between the learning of ideologies of need-achievement, and the actual striving in need-achievement.

THE DROPOUT STUDY

A small and somewhat deficient replication of Coleman's study in Malaysia is the Dropout Study which examines factors contributing to differential dropping out of Malaysian school children. In many ways, variables which were found to be significant in Coleman's study were similarly found significant in the Dropout Study. These were mainly variables relating to race, socio-economic status, sex, differential school facilities and resources, segregation of schools by race and linguistic media and urbanism, and educational motivation.

One of the most outstanding inadequacies in the Dropout Study is its oversimplification of the achievement syndrome. In attempting to transfer many of Coleman's ideas to the Malaysian situation, the Dropout Study failed to represent adequately the many highly complex components of need achievement, although the major ones were included

like Coleman's academic self-concept, sense of environmental control, time spent in doing homework, desire for education, and attitudes towards success, etc. Like Coleman's study these were mainly measures of need-achievement ideology, and how well pupils have learned them. The Dropout Study also fails to consider the actual striving in need-achievement at all. In fact, this study equates ideological beliefs with actual striving, and these are by no means the same.

The subsequent claim made in the Dropout Study that the Malay youths have a higher motivation than the Chinese (as was formerly expected), are ambiguous. It could well be "correct" however, that the Malays have responded particularly well to the propaganda of the Malaysian government concerning beliefs about achievement and its related rewards, whilst the Chinese and the Indians may possibly have responded differently, albeit realistically. A more important question perhaps is how well the Malays actually strive to achieve success, for the performance components of the need achievement syndrome may well be even more crucial for actual educational or occupational results.

The present study therefore attempts to examine if there are differences, not only in the acceptance of the need-achievement ideology among the different ethnic and social groups of Malaysia, but what is at least as important, also in the actual striving; and in the relationship of each of these to success or failure in L.C.E. and hence to educational advantage/disadvantage.

CHAPTER III

THE FACTORS

FACTORS CONTRIBUTING TO EDUCATIONAL ADVANTAGE/DISADVANTAGE

There has been much investigation in this area.

The main factors revealed are:

- (1) Lack of educational provisions in the home, for example, adequate books, lighting, suitable writing desk and room to do school work, etc.;
- (2) Differential provisions due to poverty of parents;
- (3) Cultural differences in child-rearing;
- (4) Psychosocial differences in personality traits, attitudes and beliefs, closely related to (3) above; and
- (5) The general opportunity structure of the society. By this is meant the availability of mobility channels open to all.

Factors operating to produce educational disadvantage in Malaysia are mainly socio-economic factors, cultural and religious factors, historical and geographical factors relating to the early colonisation and urbanisation of Malaysian towns, and differences due to race, sex, and educational abilities, particularly mathematical and science abilities and linguistic abilities.

In Malaysia, the development of English language is another factor. The vocabulary of technology and science in most textbooks is mainly in English, French, German and more recently in Russian. Because of Malaysia's colonial history, English has always been the language of higher education. But more recently, efforts have been made to accommodate Malay language to scientific terminology and to produce science textbooks in Malay language. This is still in process, so that one may expect much use to be made of English. Therefore students who have a good command of the English language may still have an advantage in higher education.

Of particular interest is the need-achievement factor which is closely related to modern technological societies, where achievement and its related rewards are everyday living testimonies. Need achievement involves a number of quite different factors:

1. Knowledge and Acceptance of Conventional Ideology of Success, and Knowledge of Avenues to Success especially educational avenues, and their worth. Hence, a knowledge of different job-values.
2. The Desire to Succeed -(Mere desire is however not sufficient; it must be converted into practice, and this involves internalisation of sets of habits, like deferred gratification of immediate needs for future gains, hard work, perseverance, determination, and many others, discussed in the literature); and

3. Actual Striving - All three components of need-achievement must be present to achieve success.

Because of cultural and social differences in Malaysian child-rearing practices, children in Malaysia may have internalised the ideology of success and desire for success to different degrees.

This raises a series of questions:

1. Is there differential acceptance of the ideology of striving and desire for success between the different ethnic and social groups of Malaysia?
2. Are there differences in actual striving?
3. What factors affect the learning of need-achievement ideology and the habit of actual striving in Malaysian children?

Numerous factors appear to relate to need-achievement, e.g. ambition, aspiration, realism, family expectation and teacher expectation of the child, parental and teacher pressures, soci-economic status, attitude to science and education in general, school environment, sex, race, and many others. Further these factors interact with one another to produce an unknown combined effect on need-achievement. Clearly, the need-achievement syndrome is a highly complex one, and it is not the intention of this study to investigate all the factors that enter into need-achievement, but some will be explored.

A. Summary of Variables to be Investigated

Variables that seem likely to affect success or failure in L.C.E. and hence in educational advantage/disadvantage are:

1. Parents' socio-economic status.
2. Parents' job.
3. Parents' education.
4. Pupils' ambition, aspiration and realism.
5. Family ambition for the child.
6. Pupils' actual striving in need-achievement.
7. Pupils' need-achievement ideology.
8. Pupils' acceptance of the need-achievement ideology.
9. Knowledge of conventions about the worth of jobs in Malaysia. There are a number of possible values accepted by different personalities here:
10. Need to achieve in a job.
11. Need for security of job and income.
12. Interest in a job relating to science.
13. (for girls), attitude to marriage as opposed to a vocation.
14. Time spent in doing homework.
15. Preference in school subjects.
16. Frequency of English spoken at home.
17. Interest in Science and Mathematics.
18. Pressure for achievement exerted by parents and teachers.

19. Urban or rural schooling.
20. Reasons in the choice of schools and transfer of schools (if any).
21. Attitude to science.
22. Intentions regarding the course of study for the following year.
23. Allowance of pocket money.
24. Private tuition (in relation to the child's need for achievement).
25. Proficiency in the various school subjects.
26. Sex, and
- 27 Race.

CHAPTER IV

RESEARCH DESIGN

OPERATIONAL DEFINITIONS OF VARIABLES

In order to test working hypotheses, it is necessary to obtain valid data on all the variables to be used in the hypotheses. This requires first and foremost an accurate and valid definition of all variables in operational terms.

A. Criterion Variables

1) Educational advantage/disadvantage.

As stated earlier, educational advantage/disadvantage in Malaysia is largely determined by three factors: overall educational performance, and performance in Science and in Mathematics. These give rise to three operational criterion variables.

- (i) Overall educational performance - As advantage/disadvantage has already been equated to success/failure in L.C.E. results, these being the key to entry into Form Four, a grade of pass in L.C.E. is therefore a relevant and suitable criterion measure of one's general educational advantage/disadvantage. Further, it is already in operational terms. This latter variable will therefore be measured in terms of

extent of failure or success in L.C.E. results.

The L.C.E. results were made available by the schools with the permission of the Ministry of Educational Planning and Research in Malaysia.

L.C.E. results are based on aggregate scores ranging from 5(high) to 37 or more (low), obtained from the examination results in the pupil's best five subjects; and these are graded by the Ministry as follows, with their likely educational consequences indicated.

FIGURE 1. L.C.E. GRADINGS

INDIVIDUAL SUBJECT GRADES	RAW AGGREGATES	PUBLISHED OVERALL GRADES	EDUCATIONAL CONSEQUENCES
1 (Distinction) 2	5 - 15	1 or A	Permits entry into science classes
3 4 (Credits) 5 6	16 - 25 26 - 34	2 or B 3 or C	May enter into science or arts classes Permits entry into arts classes only
7 (Passes) 8	35 - 37	4 or S	Does not permit entry to Form Four
9 (Failure)	37	5 or X	

Three alternative scales¹ of L.C.E. success were prepared:

- (a) a 9-point scale for individual subject performance.
 - (b) a 36-point scale representing the total raw aggregates (5 to 40).
 - (c) a 5-point scale (using the above 5 grades) for the overall grade in L.C.E. achieved.
- (ii) Performance in Science - This criterion variable is measured by degree of success in L.C.E. science, using the 5 point scale mentioned above. (1 high, 5 low).
- (iii) Performance in Mathematics - This is measured by success in L.C.E. mathematics, also using the 5-point scale. (1 high, 5 low).

¹The purpose in providing several alternative scales for each criterion variable, (and for some of the predictor variables as well), was to allow for greater flexibility and detail of analysis when using the AID technique. However, during the actual computer runs, it was found that computer time mounted so rapidly with finer grading of the scales that cost becomes prohibitive and anyway, interpretation of the AID "tree" becomes very complex, so that in the end only the 5 point scales were used consistently and hence only the results from these are reported in this study.

2) Need-Achievement

This is the main criterion variable for the second part of the thesis. As discussed earlier, it has two major components, an ideological one and a performance (or actual striving) one.

(i) The ideological component - This is measured by three types of scales.

(a) The job-values scale - These are ideological scales derived from a set of 30 items which ask about the values and desirability of various types of job and the rewards which are believed to follow. From various groupings of the answers, 10 simple and four complex indices of belief about jobs and job values are derived. They represent ratings of pupils' acceptance of current ideology regarding the prestige and worth of types of occupation.

The items themselves were developed from the Work Values Inventory², but suitably adjusted to meet the linguistic and cultural needs of the Malaysian children.

(b) The need-achievement test - This is a set of 10 items in Coleman's classic study and which he used to measure acceptance of the ideology regarding achievement. Whilst Coleman does not make this distinction, they appear to measure almost purely the child's incorporation of current western ideology of achievement.

² Super, D.E. Work Values Inventory. Houghton Mifflin Company. 1970.

- (c) A need-achievement ideology index - In an attempt to derive a more comprehensive need-achievement measure which represented the child's own perception of his needs and desire for education, as well as his acceptance of the need-achievement ideology, an ideology index was derived by combining a series of items from the questionnaire and the need-achievement test, and giving them suitable weightings. The resulting index is scaled from 1 to 5.
- (ii) The actual striving or performance component - This is measured by teachers' ratings on a five point scale, of how each pupil actually strives in the classroom situation itself. The ratings were made according to a set of standard criteria given to the teacher. Since the ratings relate closely to how far the pupils' need achievement is in actual agreement with effort in the classroom, it is to be expected that this component will correlate more highly with success in L.C.E. than the ideological components.
- B. Primary Effector or Predictor Variables
- 1) Socio-Economic Status
- Two different scales were separately obtained (as a check upon each other).
- (i) A teacher rating scale - for each pupil ranging from 1 (low) to 5 (high).
- (ii) An SES index - It proved difficult in the Malaysian context to get accurate details of the type usually

used in constructing the more well known indices of socio-economic status, so that use was made of some of the items used by Coleman for the same purpose. These were however adjusted to suit local conditions, derived from several items in the questionnaire, (nos. 6,7,8,9,10,11), which enquired about household possessions, education of parents, occupation of parents, and size of house in ratio to number of occupants (this is important in Asian countries where there may be many people to a room). This index is scaled from 1 to 5.

The scores in these two indices should be interpreted as scores of

- 1) lower lower,
- 2) upper lower,
- 3) lower middle,
- 4) upper middle, and
- 5) upper classes.

(In the SES index, which rated very few as 5, upper middle and upper categories were combined).

The adjusted contingency coefficient of relationship between the two indices was about 0.65.

2) Family background

This is a variable used by Coleman. It is a complex variable including

- (i) the family ideology in regard to education and achievement and
- (ii) the extent of availability of educational and

material resources in the home which help support a child, materially and intellectually, or even spiritually.

These resources include such facilities as books in the home, good light to work by, room to study, parents' education, rewards and punishment the parents imposed on the child etc. These were weighted and scaled to produce an index of range 1 to 5. (Note this scale will overlap somewhat with that of socio-economic status).

Several other scales were also derived from the items in the questionnaire. These are:

1. English scale, a scale of fluency in English, (made from items 24,30,31,32,33, and scaled 1 to 5).
2. A scale of parental pressure exerted on the child (from items 36,37,38,39,40, scaled 1 to 5).
3. A scale measuring attitudes to Science and to Mathematics. This is measured by an index derived by weighting a certain group of items of the questionnaire (nos. 18,26,30, 32).
The total scores on these items were adjusted to produce a scale of values from 1 to 5.

In addition, the scores of relevant items in the questionnaire were used as scales of the following variables:

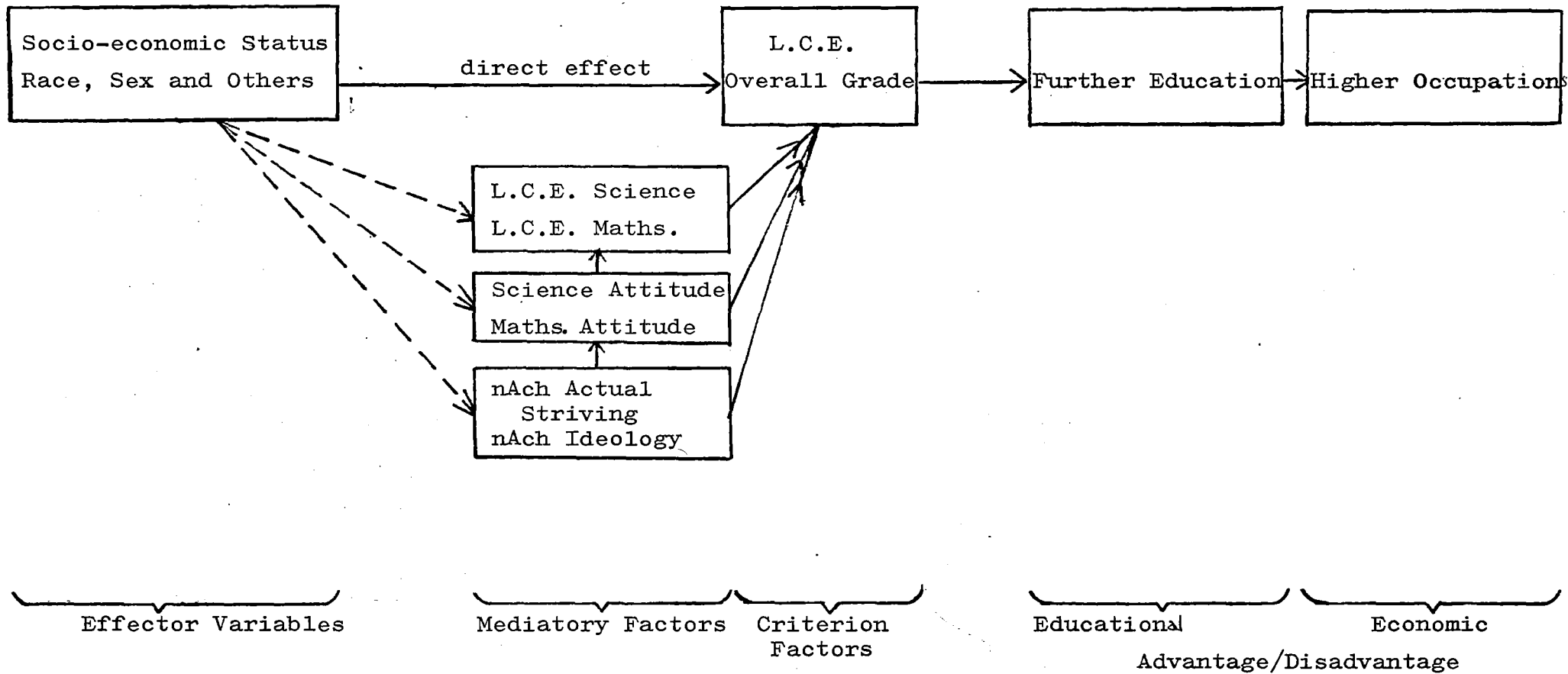
4. Parents' occupation.
5. Parents' education.
6. Ambition.
7. Realism.
8. Aspiration.
9. Intended course.
10. Self evaluation.
11. Change of Schools.
12. Subject preference in schools.
13. Girls' attitude to marriage and career.
14. Pocket money.
15. Private tuition.
16. Family ambition.
17. TIME SPENT IN DOING HOMEWORK.

In all the above scales (except L.C.E. results), a score of 1 is to be interpreted as low and 5 as high. In L.C.E., following the Malaysian custom, a score of 1 is high and 5 is low, but for uniformity purposes, scores in L.C.E. grade have thus been converted accordingly to read 5 for high and 1 for low.

A MODEL

The variables that enter into almost all social and educational situations are intricately interrelated. A few variables may be identified as operating in antecedence to others, and in this sense can be viewed as causal or independent variables, and others may be identified as the consequences, in time, of yet others, i.e. as time dependent variables. But the majority of variables are closely interrelated and partly contribute towards and partly are affected by other variables so that the terms "independent" and "dependent" variables are not strictly appropriate. Thus, it is useful to refer to what might commonly be called a dependent variable as the "criterion" variable and the independent variable^{as} an "effector" or a "predictor" variable. Thus, these terms are used in the rest of this thesis. These lead to the construction of a model.

FIGURE 2 M O D E L



- Key
- Arrows indicating direction of causality
 - Arrows indicating direct relationship
 - Arrows indicating indirect relationship

A STATEMENT OF HYPOTHESES

The following hypotheses will therefore be tested:

I. Criterion Variable - L.C.E. Grade Achieved, and Hence Educational Advantage/Disadvantage.

- H.1. Where there are differences in scores in the socio-economic status scale, there will be corresponding differences in the L.C.E. grade achieved.
- H.2. Where there are differences in ethnic membership, there will be corresponding differences in L.C.E. grades achieved.
- H.3. Where there are differences in teacher need-achievement ratings of pupils, there will be corresponding differences in L.C.E. grade achieved.
- H.4. Where there are differences in scores in the need-achievement ideology index, there will be corresponding differences in the L.C.E. grade achieved.
- H.5. Where there are differences in scores in the job need-achievement (ideology) scale, there will be corresponding differences in the L.C.E. grade achieved.
- H.6. There will be no differences between the boys and girls in the L.C.E. grade achieved.
- H.7. Where there are differences in the intended course of study in form IV, there will be corresponding differences in the L.C.E. grade achieved.

H.8. Where there are urban-rural pupil differences, there will be corresponding differences in the L.C.E. grade achieved.

H.9. Where there are differences in attitudes regarding the importance of science, there will be corresponding differences in the L.C.E. grade achieved.

H.10. Where there are differences in the number of family members who speak English at home, there will be corresponding differences in the L.C.E. grade achieved.

II. Criterion Variable - Need-Achievement ideology index, and Hence Educational Advantage/Disadvantage.

H.11. Where there are differences in scores in socio-economic status scale, there will be corresponding differences in scores in need-achievement ideology index.

H.12. Where there are differences in ethnic membership, there will be corresponding differences in need-achievement ideology index.

H.12a. Where there are differences in ethnic membership, there will be corresponding differences in teacher need-achievement ratings of pupils' actual striving.

H.13. Where there are urban-rural pupil differences, there will be corresponding differences in scores in need-achievement ideology index.

- H.13.a Where there are urban-rural pupil differences, there will be corresponding differences in ethnic membership, and hence in general educational advantage/disadvantage.
- H.14. Where there are differences in intended course of study, there will be corresponding differences in scores in need-achievement ideology index.
- H.15. Where there are differences in scores in parental pressure, there will be corresponding differences in scores in need-achievement ideology index.
- H.16. Where there are difference in L.C.E. grades achieved, there will be corresponding differences in scores in need-achievement ideology index.
- H.17. Where there are difference in L.C.E. science grades, there will be corresponding differences in scores in need-achievement ideology index.
- H.18. Where there are sex differences, there will be corresponding differences in scores in the need-achievement ideology index.
- H.19. Where there are differences in L.C.E. Mathematics grades, there will be corresponding differences in scores in need-achievement ideology index.

III. Criterion Variable - L.C.E. Science Grade, and hence Educational Advantage/disadvantage.

- H.20. Where there are differences in scores in the socio-economic status scale, there will be corresponding differences in L.C.E. science grades achieved.
- H.21. Where there are differences in teacher need-achievement ratings (of pupils' actual striving), there will be corresponding differences in L.C.E. science grades achieved.
- H.22. Where there are difference in scores in the need-achievement ideology index, there will be corresponding differences in L.C.E. science grades achieved.
- H.23. Where there are differences in ethnic membership, there will be corresponding differences in L.C.E. science grades achieved.
- H.24. There will be no difference between the boys and girls in the L.C.E. science grade achieved.
- H.25. Where there are urban-rural pupil differences, there will be corresponding differences in the L.C.E. science grade achieved.
- H.26. Where there are differences in L.C.E. overall grades, there will be corresponding differences in L.C.E. science grades achieved.

H.27. Where there are differences in the intended course next year, there will be corresponding differences in L.C.E. science grades achieved.

H.28. Where there are differences in L.C.E. mathematics grades, there will be corresponding differences in L.C.E. science grades achieved.

SURVEY INSTRUMENTS

There were five main instruments used to provide data:

1. Teacher Ratings on pupils' socio-economic status, and actual striving in need achievement. Ratings were controlled by instructions issued to teachers giving criteria for each rating level.
2. A questionnaire of items devised to provide measures which could be used to form scales of socio-economic status, need-achievement, and many others mentioned earlier.
3. A need-achievement test to measure acceptance of ideologies connected with achievement in a meritocratic state.
4. A job-value inventory to measure beliefs and ideas about jobs and their related rewards.
5. L.C.E. grades of all 1374 pupils in the sample, for examination held in October 1973.

Pilot Test

All these instruments were given a through testing in a field test with 65 pupils. Several adjustments were made to the instructions and the questionnaire. The words were carefully chosen, and when necessary made colloquial, to ensure that Malaysian pupils aged fourteen could easily understand them.

SAMPLING

SIZE OF SAMPLE

The scope of the research necessitated a large sample of 1000 or more school pupils.

The full sample consists of 1374 pupils, and there were approximately an additional 50 that had to be withdrawn due to incomplete questionnaires. It will be noted that there is an expected greater proportion of Chinese children in the total sample. This does not however, affect the testing of hypotheses, as chi-square was used in the procedure, and this automatically takes the proportions into account. However, for the exploratory programme (AID), a random subsample of Chinese pupils was taken so that the sample used in AID analysis included roughly equal numbers of each ethnic group. The numbers actually used were 269 Malays, 324 Chinese, and 307 Indians. (Note. 10 pupils in the total sample indicated their ethnic membership as 'others' and these were dropped from both parts of the study, because of their small number and unknown nature).

SELECTION OF SCHOOLS

Like most research in schools, whole classes were selected for the survey. These covered five urban and three rural schools in Klang town. For purposes of generalisation, Klang town was selected in preference to

the metropolitan city of Kuala Lumpur, because its moderate size is typical of many other townships in Western Malaysia.

Further, only English medium secondary schools were selected for two major reasons:

1. This type has the most satisfactory representation of pupils of all races in Malaysia.
2. This solves the problem of language difficulties which would occur if schools of other media were included.

SUBJECTS OF THE SAMPLE

Both boys and girls aged fourteen were included in the sample. All were third form pupils.

CHAPTER V

STATISTICAL ANALYSISSOME PROBLEMS

One of the major difficulties of analysis in a social situation is to find an appropriate statistical test or tests. Most variables operating in social situations are intercorrelated, highly interactive, combined in various ways at different levels, and many are indices (e.g. socio-economic status), and multi-dimensional factors. Their interrelationships with other factors are frequently non-linear, and further, they often take the form of nominal scales e.g. sex, race, urban-rural etc.; and hence are non-monotonic in nature or form; or rank order scales rather than true numerical scales. Finally, the distribution of social variables in the population at large is rarely normal. The problem is therefore to find a statistical method to cope with these social situations.

While the nature of the problem usually calls for some form of a multi-variate test, like analysis of variance or multiple regression, in fact, the mathematical assumptions made by these tests are such as inevitably to exclude their use. Thus, multiple regression analysis presupposes normally distributed data and linearity of

regression and should not use rank order data. Even multiple classification analysis, (M.C.A), while being able to use nominal data legitimately, nevertheless requires linearity and essentially uncorrelated data. Thus, most reasearch studies fall back on the general use of chi-square. This has the merit of making as few mathematical assumptions as possible. However, it has three draw-backs:

1. It is one of the least powerful tests in confirming or rejecting the null hypothesis, and so tends to maximise the chance of type I errors and type II errors. However, the probability of either error may be reduced by increasing the sample size.
2. It can handle only two variables at one time, one independent, and one dependent.
3. Where each variable has several categories, chi-square test will often show significance without any clear indication of the direction of relationships. For example, the relationship between race and L.C.E. grade may be significant, but it may be quite difficult to interpret the exact direction of the relationship, especially where interaction occurs. Similarly, socio-economic status may be significantly related to L.C.E. grade but in what direction is not known. In most cases however, interpretation may be made possible by collapsing the data into fewer

categories, but only at the loss of valuable information.

Despite these drawbacks, chi-square is still the main stock-in-trade of many social researchers.

THE ANALYSIS PROCEDURE

To overcome some of these difficulties, the statistical analysis is to be carried out in two ways:

1. The testing of hypotheses. For this purpose the chi-square test will be used to examine the relationship between a variety of predictor variables and the three criterion variables. This will necessitate over 90 calculations of chi-square.

When a large number of chi-square tests of hypotheses has to be made, one inevitably increases the risk that at least some of the results of the confirmed hypotheses may, in fact, have occurred by chance, and so be in error (type I error). Thus, for example at the 5% level of confirmation, one might expect about 5 out of every 100 decisions to be in error, purely as a result of chance.

To reduce this error, it was decided to stipulate a much more severe level of confirmation/rejection than the usual 5% or 1% levels. To avoid increasing the converse error (type II error), one must take a

fairly large sample.

Thus, it was decided to select a sample size of between 1000 and 1500. It was then possible to adopt the following levels of significance for establishing degrees of confirmation or rejection of the hypotheses:

	$p \geq 0.05$	- not significant.
0.01	$< p < 0.05$	-- doubtfully significant.
0.001	$< p < 0.01$	- significant.
0.0001	$< p < 0.001$	- very significant.
	$p \leq 0.0001$	- extremely significant.

The last three levels create a very severe test of the null hypothesis. Thus we may have very great confidence in accepting our experimental hypotheses if they are confirmed at these levels. At the same time, we can have equal confidence in rejecting them and accepting the null hypothesis, when the probability of occurrence is greater than 0.05.

This procedure leaves, however, a region of doubt from $p = 0.05$ to $p = 0.01$, and results falling in this region will either be accepted or rejected only with considerable caution.

It will be useful, also, to have direct measures of the correlation between the predictor and criterion variables. However, the nature of most social

data poses similar difficulties in the selection of appropriate correlational techniques, e.g. when variables are not continuous, when the distribution of variables in the population is not normal, and when the relationship is curvilinear. Therefore the Product-moment correlation cannot be used. Curvilinearity would distort Kendall's Tau and Sp^{er}man rank order coefficient. The only practical and legitimate association appears to be the contingency coefficient (C). This may readily be calculated from chi-square by the formula

$$C = \sqrt{\frac{x^2}{x^2 + N}}$$

Under certain circumstances, the value of C closely approximates Pearson's r , viz, when

- (1) the distribution is reasonably normal;
- (2) the variables are basically continuous even if they are expressed in interval categories; and
- (3) the sample is large. When such conditions apply, Guilford¹ claims that C may roughly be interpreted as corresponding to Pearson's r .

Further, Peters and Van Voorhis² have provided a table for corrections to Pearson's r for the coarseness of groupingsⁱⁿ the data. Guilford³ claims that this may also be applied to C. to give a true value where

¹ Guilford, J.P. Fundamental Statistics in Psychology and Education. McGraw-Hill Book Company. 3rd Edition - 1956.

² Ibid, P. 329.

³ Op. cit., P. 316.

appropriate; therefore, it is proposed to apply this correction to C. The results will be reported as C adjusted or C unadjusted. The resulting coefficients may be interpreted, with caution, in a similar manner to Pearson's r .

It should be noted that because of the complex nature of the variables contributing to disadvantage, and because of the very considerable number of predictor variables which contribute to each of the three criterion variables, it is to be expected that C will in most cases be less than 0.50. However, the large sample and the very strict standard adopted for significance means that even a relatively low value of C is statistically real (the Chi-square significance may be used as a measure of the significance of C). Secondly, the great social significance of the problem of educational advantage/disadvantage to any society, and its economic, political or educational repercussions, means from the practical point of view, even a small relationship, if real, may be of practical social importance. That is, a relationship may have practical as well as social significance. There are no conventional criteria for establishing levels of practical significance so that it is arbitrarily decided that all C values over 0.20 would seem to have significance for actions, and C values over 0.50 to have considerable practical significance.

All hypotheses postulated were therefore submitted therefore submitted to the chi-square test for decision.

In addition, many variables considered relevant to the disadvantage problem were examined by the chi-square test even when no hypotheses were made. The intention here was to use these latter results to help formulate hypotheses for future testing. This second section really belongs to the second part of the analysis - the exploratory program.

2. The Exploration of Interactions Between Variables

by Sonquist and Morgan's Automatic Interaction Detection (A.I.D.) technique⁴. This procedure is not a test of hypotheses, and no hypotheses were made here. It is primarily a method of identifying, among many variables, those predictor variables which explain the maximum variance in the criterion variables.

The essence of the technique is to split a group into two sub-groups on the basis of their scores on some predictor variable, in such a way that membership of the two sub-groups best predicts the score of the sub-group members on the criterion variable. This is repeated in the sub-groups in turn. The final result is a membership tree whose twigs represent these sub-groups, membership of which is the most effective predictor of the criterion variable. Since

⁴. Sonquist, J.A. and James A. Morgan. The Detection of Interaction Effects. University of Michigan, 1970.

each sub-group is categorised by any combination of predictor variables, interaction is simply accommodated and is made highly visible in the tree.

A more formal explanation of the AID procedure due to Sonquist and Morgan⁵ is to be found in Appendix II.

The AID technique has many advantages over Multiple Classification Analysis (MCA):

1. It locates interacting variables which cannot be represented adequately in their raw form in MCA.
2. It solves the problem of determining which of the predictor variables are related to the criterion variable and under what conditions and through which intervening processes, thus avoiding the exclusion of variables which could have been erroneously considered not important.
3. It allows the checking of the existence of non-symmetric differences between groups so as to select the set of sub-groups which will reduce the error in predicting the criterion variable.

However, AID has its disadvantages too. It cannot handle highly skewed distribution in the predictor variables satisfactorily, or predictors with many ^{sub} classes. Another problem is that of competition between the highly correlated variables used to explain variance, and the substitution

⁵. Op. cit.

of one variable for another closely correlated with it, in the partitioning process.

In sum, the technique of AID was used in this study purely for exploratory purposes of identifying important effector variables related to advantage/disadvantage, so that in a later study, relatively uni-dimensional variables and indices may be built, and multiple classification analysis may be used to make legitimate and accurate estimates of the contribution of those predictor variables to the criterion variable.

SUMMARY

The statistical analysis is therefore in three parts:

1. Chi-square tests of those hypotheses already postulated.
2. An examination of chi-square measures of the relationships among other variables, for identifying effector variables for future study. No hypotheses were made or tested here.
3. An exploration of interaction between variables by AID for future use. No hypotheses were tested here.

CHAPTER VI

RESULTS

REPORTING THE RESULTS

There are three sections:

- I) Decisions on hypotheses postulated. For each hypothesis postulated, in turn, the contingency table would be presented with chi-square values (X^2), degree of freedom (d_f) and the probability (p) level at which chance could account for the result, together with the degree of significance. This would be followed by the contingency coefficient (C) adjusted for coarseness of groupings; (except ^{that} where the correlation is below 0.20, the contingency coefficient would not be given at all, since it would present no practical significance). This would be followed by decisions on the hypothesis made. Finally, a brief comment on the hypothesis will be given where appropriate. A fuller conclusion will be considered later.

- II) Abbreviated display of X^2 values and Contingency coefficient for the relationships between criterion and predictor variables for which no hypotheses were made, but for which considerable relationships were found. This section is included because it provides

guides towards later study and hypotheses to be tested further. These should not be interpreted as confirming or not confirming hypotheses since no hypotheses were made in reagrd to them, although they were of course included in the questionnaires because of their importance related to educational advantage/disadvantage.

III) Results of Automatic Interaction Detection (A.I.D.)

Analysis shown in the form of 'trees' of educational advantage/disadvantage, with brief comments. A fuller discussion would be included in the conclusion chapter.

Results

Section I

DECISION ON HYPOTHESES

RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS (S.E.S.) SCALE
AND L.C.E. GRADE

Hypothesis - H. 1. Where there are differences in scores in the socio-economic status scale, there will be corresponding differences in the L.C.E. grade achieved, and hence in general educational advantage/disadvantage.

Result

	L.C.E. grade					
	low	1	2	3	4	5 high
S.E.S. SCALE	1	82	9	22	16	5
	2	274	21	141	107	48
	3	130	8	133	149	60
	4 high	21	4	23	68	53

$N = 1374$
 $\chi^2 = 210.006$
 $df = 12$
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.422

TABLE 1. S.E.S. Scale and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.1. confirmed.

Conclusion

There is a direct relationship between the socio-economic status scale and success in L.C.E. Pupils who scored high in the S.E.S. scale also achieved better grades in L.C.E.

RELATIONSHIP BETWEEN RACE AND L.C.E. GRADE

Hypothesis - H. 2. Where there are differences in ethnic membership, there will be corresponding differences in L.C.E. grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. grade					
		low	1	2	3	4	5 high
RACE	MALAYS	129	7	54	59	20	$N = 1374$ $\chi^2 = 79.74$ $df = 8$ $p < 0.0001$ (extremely sig.) Contingency coef. (adjusted) = 0.234
	CHINESE	218	25	202	225	128	
	INDIANS	160	10	63	56	18	

TABLE 2. Race and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.2. accepted.

Conclusion

There is a strong relationship between race and L.C.E. grades achieved. The Chinese are the best achievers in L.C.E., followed by Malays and then the Indians.

RELATIONSHIP BETWEEN TEACHER NEED-ACHIEVEMENT RATING (ACTUAL STRIVING) AND L.C.E. GRADE

Hypothesis - H.3. Where there are differences in teacher need-achievement ratings of pupils, there will be corresponding differences in L.C.E. grade achieved, and hence in general educational advantage/disadvantage.

Result

Result

L.C.E. grade

low12345high

Teacher

nAch

ratings

(actual

striving)

1

152

6

12

3

1

2

168

18

69

38

2

3

134

11

170

165

46

4

23

4

60

110

75

5

30

3

8

24

42

high

N = 1374

$\chi^2=561.690$

df = 16

p < 0.0001

(extremely sig.)

Contingency coef.

(adjusted) = 0.606

TABLE 3. Teacher Need-Achievement Ratings and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.3. accepted.

Conclusion

There is a strong and direct relationship between teacher need-achievement ratings and L.C.E. grade. Pupils who are rated high by teachers on their actual striving to achieve ~~also~~ ~~achieved~~ better grades in L.C.E.

RELATIONSHIP BETWEEN NEED-ACHIEVEMENT INDEX (IDEOLOGY AND DESIRE) AND L.C.E. GRADE

Hypothesis - H. 4. Where there are differences in scores in the need-achievement ideology index, there will be corresponding differences in the L.C.E. grade achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. grade						
		low	1	2	3	4	5	high
nAch index (ideology and desire)	1		26	0	7	1	1	
	2		97	6	23	15	7	
	3		213	14	115	88	32	
	4		135	15	127	58	67	
	5	high	36	7	47	78	59	

$N = 1374$
 $\chi^2 = 204.748$
 $df = 16$
 $P < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.405

TABLE 4. nAch Ideology Index and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.4. confirmed.

Conclusion

There is a direct relationship between the need-achievement ideology (and desire) index and the L.C.E. grades achieved. Pupils who have successfully internalised the success ideology of achievement tend to achieve better L.C.E.

grades. However, the reader needs to be reminded that this need-achievement ideology index does not measure the actual striving involved in the need-achievement syndrome.

RELATIONSHIP BETWEEN NEED-ACHIEVEMENT SCALE (IDEOLOGY
AND JOB VALUES) AND L.C.E. GRADE

Hypothesis - H.5. Where there are differences in scores in the job need-achievement (ideology) scale, there will be corresponding differences in the L.C.E. grade achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. grade					
		low	1	2	3	4	5high
nAch Scale (ideology and job values)	1	1	0	2	1	0	
	2	56	2	42	44	22	
	3	197	22	134	146	82	
	4	210	14	106	121	52	
	5 high	43	4	35	28	10	

$N = 1374$

$\chi^2 = 18.540$

$df = 16$

$p > 0.05$

(not sig.)

Note: The nAch scale is a combined scale of self report on ambition, aspiration etc., and the nAch (ideology) test.

TABLE 5. Need-Achievement (ideology) Scale and L.C.E.

Grade Achieved

Decision

The null hypothesis will be accepted, and H.5. disconfirmed.

Conclusion

There is no relationship between the need-achievement

scale and L.C.E. grade achieved i.e. a high score in the job need-achievement (ideology) scale does not necessarily correspond to a high L.C.E. grade.

RELATIONSHIP BETWEEN SEX AND L.C.E. GRADE

Hypothesis - H.6. There will be no differences between the boys and girls in the L.C.E. grade achieved and hence in educational advantage/disadvantage.

Result

		L.C.E. grade						
		low	1	2	3	4	5	high
Sex	Boys		247	25	166	164	91	
	Girls		260	17	154	175	75	

$N = 1374$
 $\chi^2 = 4.1017$
 $df = 4$
 $p > 0.05$
 (not sig.)

TABLE 6. Sex and L.C.E. Grade Achieved

Decision

The null hypothesis will be accepted at $p > 0.05$, H.6 is therefore ^{not} confirmed.

Conclusion

Because of the very large sample, resulting in a very sensitive χ^2 test, it may be reasonably concluded that there is no appreciable difference between the boys and girls in the L.C.E. grade achieved.

RELATIONSHIP BETWEEN INTENDED COURSE OF STUDY IN FORM IV
AND L.C.E. GRADE

Hypothesis - H. 7. Where there are differences in the intended course of study in form IV, there will be corresponding differences in the L.C.E. grade achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. grade						
		low	1	2	3	4	5	high
<u>Intended</u>	<u>Course</u>							
	ARTS	190	9	113	59	7		
	SCIENCE	138	17	119	219	143		
	VOCATIONAL	122	13	82	60	16		
	(commercial							
	and Technica)							
	DROP-OUT	57	3	5	2	0		

$N = 1374$
 $\chi^2 = 288.336$
 $df = 12$
 $P < 0.0001$
(extremely sig.)
Contingency coef.
(unadjusted) = 0.416

TABLE 7. Intended Course and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.7. confirmed.

Conclusion

There is a direct relationship between intended course of study and the L.C.E. grade achieved. Pupils who intend to do a science course achieved better L.C.E. grades than pupils who intend to do either an arts course, or a vocational course, or drop-out after form III.

RELATIONSHIP BETWEEN URBAN/RURAL PUPILS AND L.C.E. GRADE

Hypothesis - H.8. Where there are urban/rural pupil differences, there will be corresponding differences in the L.C.E. grade achieved and hence in general educational advantage/disadvantage.

Result

		L.C.E. grade						
		low	1	2	3	4	5	high
Pupils	URBAN		348	30	231	273	140	
	RURAL		159	12	88	67	26	

$N = 1374$
 $\chi^2 = 19.553$
 $df = 4$
 $0.0001 < p < 0.001$
 (very sig.)
 Contingency coef.
 (unadjusted) = 0.118

TABLE 8. Urban/Rural Pupils and L.C.E. Grade

Decision

The null hypothesis will be rejected at $0.0001 < p < 0.001$ and H.8. accepted.

Conclusion

There are urban/rural pupil differences in L.C.E. grade achieved. Pupils in the urban schools tend to achieve better L.C.E. grades than pupils in the rural schools.

RELATIONSHIP BETWEEN ATTITUDE TO SCIENCE AND L.C.E. GRADE

Hypothesis - H.9. Where there are differences in attitudes regarding the importance of science, there will be corresponding differences in the L.C.E. grade achieved, and hence in general education advantage/disadvantage.

Result

<u>Attitude to</u>	L.C.E. grade					
<u>Science</u>	low	1	2	3	4	5 high
SCIENCE NOT IMPORTANT		342	26	212	144	44
SCIENCE IMPORTANT		165	16	107	196	122

$N = 1374$

$\chi^2 = 125.995$

$df = 4$

$p < 0.0001$

(extremey sig.)

Contingency coef.

(undadjusted) = 0.290

TABLE 9. Importance of Science and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.9. accepted.

Conclusion

There is a direct relationship between attitude to science and L.C.E. grades achieved. Third formers who regard science as an important subject of study tend to achieve better L.C.E. grades.

RELATIONSHIP BETWEEN ENGLISH-SPEAKING HOMES AND L.C.E. GRADE

Hypothesis - H.10. Where there are differences in the number of family members who speak English at home, there will be corresponding differences in the L.C.E. grade achieved, and hence, in general educational advantage/disadvantage.

Result

<u>Result</u>	L.C.E. grade					
	low	1	2	3	4	5high
NUMBER OF English speaking members in the family	1	95	7	51	38	23
	2	227	23	116	120	67
	3	110	6	91	96	40
	4	51	4	34	47	19
	5	24	2	27	39	17
high						

$N = 1374$

$\chi^2 = 39.639$

$df = 16$

$0.0001 < P < 0.001$
(very sig.)

Contingency coef.
(adjusted) = 0.188

TABLE 10. English-Speaking Members in the Family
and L.C.E. Grade Achieved

Decision

The null hypothesis will be rejected at $0.0001 < p < 0.001$ and H.10. confirmed.

Conclusion

There is a relationship between English-speaking homes and L.C.E. grades achieved. Pupils who come from

homes where English is spoken more frequently and have brothers, sisters, parents and relatives who speak English at home, are more likely to achieve better L.C.E. grades.

RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS (SES) SCALE
AND NEED-ACHIEVEMENT (nAch) IDEOLOGY INDEX

Hypothesis - H. 11. Where there are differences in scores in socio-economic status scale, there will be corresponding differences in scores in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

Result

nAch Ideology Index

low 1 2 3 4 5 high

S.E.S.
SCALE

1 11 30 49 33 11

2 16 89 224 186 76

3 8 25 154 207 86

4 0 4 35 76 54

High

N = 1374

$\chi^2 = 140.388$

df = 12

P < 0.0001

(extremely sig.)

Contingency coef.

(adjusted) = 0.352

TABLE 11. S.E.S. Scale and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 11. confirmed.

Conclusion

There is a direct relationship between socio-economic status scale and the need-achievement ideology index. Pupils from the higher socio-economic status families tend to show a higher nAch ideology score. In general however,

Malaysian pupils of all S.E.S. groups tend to show a high need-achievement ideology score. It seems reasonable to conclude therefore that most pupils in Malaysia have successfully internalised the need-achievement ideology.

RELATIONSHIP BETWEEN RACE AND NEED-ACHIEVEMENT IDEOLOGY INDEX

Hypothesis - H.12. Where there are differences in ethnic membership, there will be corresponding differences in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

<u>RACE</u>	low	nAch ideology index					high
		1	2	3	4	5	
MALAYS		3	23	72	119	52	
CHINESE		25	96	297	279	101	
INDIANS		7	29	93	104	74	

$N = 1374$
 $\chi^2 = 32.914$
 $df = 8$
 $0.0001 < p < 0.001$
 (very sig.)
 Contingency coef.
 (unadjusted) = 0.153

TABLE 12. Race and nAch Ideology Index

Decision

The null hypothesis will be rejected at $0.0001 < p < 0.001$ and H.12 confirmed.

Conclusion

There is a relationship between race and need-achievement ideology index. A greater proportion of the Malays seem to have successfully internalised the success ideology of achievement than the Indians and the Chinese. The problem arises when the Malays are actually less

striving than the Chinese and the Indians, as indicated in the teacher's need-achievement ratings of pupils in Table 12a.

RELATIONSHIP BETWEEN TEACHER NEED-ACHIEVEMENT RATINGS OF
PUPILS, ACTUAL STRIVING AND RACE

Hypothesis - H.12a. Where there are differences in ethnic membership, there will be corresponding differences in teacher need-achievement ratings of pupils' actual striving, and hence in general educational advantage/disadvantage.

Result

Report

Teacher nAch ratings	
<u>RACE</u>	low 1 2 3 4 5high
MALAYS	43 67 104 31 25
CHINESE	70 153 317 199 58
INDIANS	61 75 106 42 23

$N = 1374$

$\chi^2 = 57.601$

$df = 8$

$p < 0.0001$

(extremely sig.)

Contingency coef.

(unadjusted) = 0.201

TABLE 12.a Race and Teacher nAch Ratings

Decision

The null hypothesis will be rejected at $P < 0.0001$ and H. 12a confirmed.

Conclusion

There is a strong relationship between race and teacher need-achievement ratings, in favour of Chinese, followed by Indians and then Malays.

RELATIONSHIP BETWEEN URBAN-RURAL PUPILS AND NEED-ACHIEVEMENT
IDEOLOGY INDEX

Hypothesis - H.13. Where there are urban-rural pupil differences, there will be corresponding differences in scores in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

Results

		nAch ideology index						
		low	1	2	3	4	5	high
School pupils	URBAN	21	109	340	379	173	$N = 1374$ $\chi^2 = 4.66$ $df = 4$ $p > 0.05$ (not sig.)	
	RURAL	14	39	122	123	54		

TABLE 13. Urban-rural Pupils and nAch Ideology Index

Decision

The null hypothesis will be accepted at $p > 0.05$, and H. 13 disconfirmed.

Conclusion

There is no relationship between urban-rural pupils and the need-achievement ideology index. Both urban and rural school pupils have equally internalised the success ideology successfully.

RELATIONSHIP BETWEEN URBAN-RURAL PUPILS AND RACE

Hypothesis - H.13a Where there are urban-rural pupil differences, there will be corresponding differences in ethnic membership, and hence in general educational advantage/disadvantage.

Result

		Race			
		Malay	Chinese	Indians	
Pupils	URBAN	165	646	205	$N = 1354$ $\chi^2 = 50.65$ $df = 2$ $p < 0.0001$ (extremely sig.) Contingency coef. (unadjusted) = 0.19
	RURAL	95	141	102	

TABLE 13.a Urban-Rural Pupils and Race

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.13a confirmed.

Conclusion

There is a significant relationship between urban-rural pupils and race. A bigger proportion of rural-school pupils are Malays and Indians, whilst a bigger proportion of urban school pupils are Chinese.

RELATIONSHIP BETWEEN INTENDED COURSE OF STUDY AND NEED-
ACHIEVEMENT IDEOLOGY INDEX

Hypothesis - H.14. Where there are differences in intended course of study, there will be corresponding differences in scores in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

<u>Intended course</u>	nAch ideology index				
	low	1	2	3	4
ARTS	8	48	170	117	35
SCIENCE	7	35	157	278	159
Vocational comm- mercial or technical)	12	39	114	98	30
DROP OUT	8	26	21	9	3

N = 1374

$\chi^2 = 207.287$

df = 12

p < 0.0001

(extremely sig.)

Contingency coef.
(unadjusted)=0.362

TABLE 14. Intended Course and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 14 confirmed.

Conclusion

There is a direct relationship between intended course of study and the need-achievement ideology index. Those intending to do a science course scored the highest in the nAch ideology index, followed by those intending to do either a commercial or a technical course, and those

intending to do an arts course. Those intending to drop out of the schools scored the lowest in the nAch ideology index.

RELATIONSHIP BETWEEN PARENTAL PRESSURE AND NEED-ACHIEVEMENT
IDEOLOGY INDEX

Hypothesis - H. 15 Where there are differences in scores in parental pressure, there will be corresponding differences in scores in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

		nAch ideology index						
		low	1	2	3	4	5	high
Parental Pressure	1		3	12	13	5	1	
	2		19	43	99	42	6	
	3		13	74	221	195	44	
	4		0	19	122	204	96	
	5		0	0	7	56	80	
		high						

$N = 1374$
 $\chi^2 = 413.237$
 $df = 16$
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.541

TABLE 15. Parental Pressure and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.15 confirmed.

Conclusion

There is a direct relationship between parental pressure and the need-achievement ideology index. Pupils who received a great deal of parental pressure also internalised the need-achievement ideology more successfully.

RELATIONSHIP BETWEEN L.C.E. GRADE AND NEED-ACHIEVEMENT

IDEOLOGY INDEX

Hypothesis - H. 16. Where there are differences in L.C.E. grades achieved, there will be corresponding difference in scores in need-achievement ideology index, and hence general educational advantage/disadvantage.

Result

		nAch ideology index				
	low	1	2	3	4	5high
1		26	103	227	150	43
2		7	23	115	127	47
3		1	15	88	158	78
4		1	7	32	67	59
high						

$N = 1374$
 $\chi^2 = 196.004$ df = 12
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.409

TABLE 16. L.C.E. Grade and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$, and H.16 confirmed.

Conclusion

There is a direct relationship between the total L.C.E. grade achieved and the need-achievement ideology index. Pupils who scored a high L.C.E. grade also showed a high score in the need-achievement ideology index.

RELATIONSHIP BETWEEN L.C.E. SCIENCE GRADES AND
NEED-ACHIEVEMENT IDEOLOGY INDEX

Hypothesis - H. 17. Where there are differences in L.C.E. science grades, there will be corresponding differences in scores in need-achievement ideology index and hence in general educational advantage/disadvantage.

Result

Result

nAch ideology index

low 1 2 3 4 5 high

L.C.E.
Science
Grades

1	15	77	140	85	17
2	13	41	154	160	69
3	5	17	97	135	53
4	1	10	48	83	55
5	1	3	23	39	33

high

$$N = 1374$$

$$\chi^2 = 169.862$$

$$df = 16$$

$$p < 0.0001$$

(extremely sig.)

Contingency coef.

(adjusted) = 0.373

$N = 1374$

$\chi^2 = 169.862$

$df = 16$

$p < 0.0001$

(extremely sig.)

Contingency coef.

(adjusted) = 0.373

TABLE 17. L.C.E. Science Grades and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 17 confirmed.

Conclusion

There is a direct relationship between L.C.E. science grades and the need-achievement ideology index. Those who achieved high L.C.E. science grades also scored higher in the need-achievement ideology index.

RELATIONSHIP BETWEEN SEX AND NEED-ACHIEVMENT IDEOLOGY INDEX

Hypothesis - H. 18 Where there are sex differences, there will be corresponding differences in scores in the need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

		nAch ideology index						
		low	1	2	3	4	5	high
BOYS		10	130	363	186	4	$N = 1374$ $\chi^2 = 29.06$ df = 4 $p < 0.0001$ (extremely sig.) Contingency coef. (unadjusted) = 0.144	
GIRLS		1	90	445	142	3		

TABLE 18. Sex and nAch Ideology Index

Decision The null hypothesis will be rejected at $p < 0.0001$ and H. 18 confirmed.

Conclusion

There is a relationship between sex and need-achievement ideology index. Boys tend to show a stronger acceptance of the success ideology than girls.

RELATIONSHIP BETWEEN L.C.E. MATHEMATICS GRADES AND
NEED-ACHIEVEMENT IDEOLOGY INDEX

Hypothesis - H. 19. Where there are differences in L.C.E. Mathematics grades, there will be corresponding differences in scores in need-achievement ideology index, and hence in general educational advantage/disadvantage.

Result

Result

nAch ideology index

low 1 2 3 4 5high

L.C.E. Maths. grades

1	15	78	167	112	29
2	12	44	155	173	69
3	7	19	90	121	55
4	1	4	39	63	48
5	0	3	11	33	26

high

N = 1374

$\chi^2 = 142.283$

df = 16

p < 0.0001

(extremely sig.)

Contingency coef.

(adjusted) = 0.344

TABLE 19. L.C.E. Maths. Grades and nAch Ideology Index

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 19 confirmed.

Conclusion

There is a strong relationship between L.C.E. Maths. grades and the need-achievement ideology index. Pupils who scored high mathematics grades also scored high in the need-achievement ideology index.

RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS (S.E.S.) SCALE
AND L.C.E. SCIENCE GRADES

Hypothesis - H. 20. Where there are differences in scores in the socio-economic status scale, there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. Science grade						
		low	1	2	3	4	5	high
S.E.S. Scale	1		63	39	20	9	3	
	2		181	205	112	63	30	
	3		81	156	129	74	40	
	4		9	37	46	51	26	
		high						

$N = 1374$
 $\chi^2 = 159.599$
 $df = 12$
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.373

TABLE 20. S.E.S. Scale and L.C.E. Science Grade Achieved

Decision The null hypothesis will be rejected at $p < 0.0001$ and H. 20 confirmed.

Conclusion

There is a direct relationship between socio-economic status scale and L.C.E. science grade achieved. Pupils who scored high in the socio-economic status scale also scored better L.C.E. science grades.

RELATIONSHIP BETWEEN TEACHER NEED-ACHIEVEMENT RATINGS
(OF PUPILS' ACTUAL STRIVING) AND L.C.E. SCIENCE GRADES

Hypothesis - H. 21. Where there are differences in teacher need-achievement ratings (of pupils' actual striving), there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. Science grade						
		low	1	2	3	4	5	high
Teacher nAch ratings (actual striving)	1	122	45	5	1	1		
	2	99	126	55	13	2		
	3	77	194	145	87	23		
	4	11	61	82	71	47		
	5 high	25	11	20	25	26		

$N = 1374$

$\chi^2 = 505.959$

$df = 16$

$p < 0.0001$

(extremely sig.)

Contingency coef.

(adjusted) = 0.583

TABLE 21. Teacher nAch Ratings and L.C.E. Science
Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 21 confirmed.

Conclusion

There is a direct relationship between teacher need-achievement ratings of pupil's actual striving and

L.C.E. Science grades. Pupils rated high by teachers on their actual effort in the classroom tend to achieve better L.C.E. science grades.

RELATIONSHIP BETWEEN NEED-ACHIEVEMENT IDEOLOGY INDEX AND
L.C.E. SCIENCE GRADES

Hypothesis - H. 22. Where there are differences in scores in the need-achievement ideology index, there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. Science grade						
		low	1	2	3	4	5	high
nAch ideology index	1		15	13	5	1	1	
	2		77	41	17	10	3	
	3		140	154	97	48	23	
	4		85	160	135	83	39	
	5		17	69	53	55	33	
		high						

N= 1374
 $\chi^2 = 169.862$ df = 16
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.373

TABLE 22. nAch Ideology Index and L.C.E. Science Grades

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.22 confirmed.

Conclusion

There is a direct relationship between need-achievement ideology index and L.C.E. science grade achieved. Those who showed a strong acceptance of the success ideology also achieved better L.C.E. science grades.

RELATIONSHIP BETWEEN RACE AND L.C.E. SCIENCE GRADES

Hypothesis - H. 23. Where there are differences in ethnic membership, there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

RACE L.C.E. Science grade

MALAY	103	93	45	25	3
CHINESE	112	240	212	148	86
INDIANS	119	104	50	24	10

N = 1374

$\chi^2 = 122.92$ df = 8

$p < 0.0001$

(extremely sig.)

Contingency coef.

(unadjusted)=0.287

TABLE 23. Race and L.C.E. Science Grade Achieved

Decision The null hypothesis will be rejected at $p < 0.0001$ and H. 23 confirmed.

Conclusion

There is a relationship between race and L.C.E. science grade achieved. The Chinese achieved the best in L.C.E. science, followed by Indians and then the Malays.

RELATIONSHIP BETWEEN SEX AND L.C.E. SCIENCE GRADES

Hypothesis - H.₂₄ There will be no differences between the boys and girls in the L.C.E. science grade achieved.

Result

<u>SEX</u>	L.C.E. science grade				
	1	2	3	4	5
BOYS	156	212	160	104	61
GIRLS	178	224	148	93	38

$$N = 1374$$

$$\chi^2 = 8.102 \text{ df} = 4$$

$$p > 0.05$$

(not sig.)

TABLE 24. Sex and L.C.E. science grade achieved

Decision

The null hypothesis will be accepted at $p > 0.05$ and H. 24_A^{not} confirmed.

Conclusion

There is no sex differences in L.C.E. science grades. This is probably due to a variety of factors, one of which is the increasing emphasis on the importance of a science education for both boys and girls in schools throughout Malaysia. However, the difference is likely to become significant in the higher levels of education.

RELATIONSHIP BETWEEN URBAN-RURAL PUPILS AND L.C.E.

SCIENCE GRADES

Hypothesis- H. 25. Where there are urban-rural pupil differences, there will be corresponding differences in the L.C.E. science grade achieved, and hence in general educational advantage/disadvantage.

Result

Pupils	L.C.E. Science grade				
	1	2	3	4	5
URBAN	215	311	239	168	89
RURAL	119	126	68	29	10

$N = 1374$

$\chi^2 = 96.87$ df = 4

$p < 0.0001$

(extremely sig.)

Contingency coef.
(unadjusted) = 0.257

TABLE 25. Urban-Rural Pupils and L.C.E. Science
Grade Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 25 confirmed.

Conclusion

There are significant urban-rural pupil differences in L.C.E. science grade achieved. Pupils in the urban schools tend to achieve better L.C.E. science grades than pupils in the rural schools.

RELATIONSHIP BETWEEN L.C.E. OVERALL GRADES AND L.C.E.

SCIENCE GRADE

Hypothesis - H. 26. Where there are differences in L.C.E. overall grades, there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. science grade						
		low	1	2	3	4	5	high
L.C.E.	1		321	160	26	0	0	
Overall	2		4	38	0	0	0	
grade	3		8	198	107	6	0	
	4		1	41	166	121	11	
	5		0	0	8	70	88	
	high							

$N = 1374$
 $\chi^2 = 1823.735$
 $df = 16$
 $p < 0.0001$
 (extremely sig.)
 Contingency coef.
 (adjusted) = 0.849

TABLE 26. L.C.E. Overall Grade and L.C.E. Science Grade

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H.26 confirmed.

Conclusion

There is a direct and strong relationship between the overall L.C.E. grade achieved and the L.C.E. science grade achieved. Pupils who achieved high L.C.E. overall grades also achieved high L.C.E. science grades.

RELATIONSHIP BETWEEN INTENDED COURSE NEXT YEAR AND L.C.E.

SCIENCE GRADES

Hypothesis - H. 27. Where there are differences in the intended course next year, there will be corresponding differences in L.C.E. science grades achieved and hence in general educational advantage/disadvantage.

		L.C.E. science grade					
<u>Result</u>		1	2	3	4	5	
Intended Course	ARTS	122	162	75	17	2	$N = 1374$ $\chi^2 = 308.035$ $df = 12$ $p < 0.0001$ (extremely sig.) Contingency coef. (unadjusted) = 0.428
	SCIENCE	80	48	171	150	87	
	Vocational (Technical and commercial)	84	113	57	29	10	
	DROP OUT	48	14	4	1	0	

TABLE 27. Intended Course and L.C.E. Science Grade
Achieved

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 27 confirmed.

Conclusion

There is a strong relationship between intended course and L.C.E. science grades. Pupils intending to do a science course achieved better L.C.E. science grades than pupils intending to do either an arts or a vocational course, or to drop out of schools the following year.

RELATIONSHIP BETWEEN L.C.E. MATHEMATICS GRADES AND
L.C.E. SCIENCE GRADES

Hypothesis - H. 28. Where there are differences in L.C.E. mathematics grades, there will be corresponding differences in L.C.E. science grades achieved, and hence in general educational advantage/disadvantage.

Result

		L.C.E. science grade				
L.C.E. Mathe- matics grade	low	1	2	3	4	5 high
1		282	110	9	0	0
2		50	257	130	15	1
3		2	67	128	83	12
4		0	3	36	76	40
5		0	0	4	23	46
high						

$N = 1374$

$\chi^2 = 1554.695$ df = 16

$p < 0.0001$

(extremely sig.)

Contingency coef.
(adjusted) = 0.819

TABLE 28. L.C.E. Maths. Grade and L.C.E. Science Grade

Decision

The null hypothesis will be rejected at $p < 0.0001$ and H. 28 confirmed.

Conclusion

There is a strong and direct relationship between L.C.E. mathematics grade and L.C.E. science grade achieved. Those who did well in L.C.E. mathematics also did well in L.C.E. science.

Results

Section II

DATA ON OTHER VARIABLES NOT SPECIFICALLY CONTAINED IN PRIOR HYPOTHESES

(Note: Many combinations of variables were examined by chi-square even when no hypotheses were made. It is of course not legitimate to capitalise on these results without prior hypotheses, but they are included because they are suggestive of hypotheses for future examination. The actual raw data are however not included, only the chi-square values are given.)

TABLE A. CRITERION VARIABLE L.C.E. GRADE AND OTHER PREDICTOR VARIABLES

Predictor variables	χ^2	df.	p	Contingency Coefficient C (adjusted)
Teacher S.E.S. ratings	74.869	12	< 0.0001 (extremely sig.)	0.263
Parents' job	177.735	12	" "	0.338 (unadjusted)
Parents' education	139.089	8	" "	0.303 (unadjusted)
Realism	245.588	16	" "	0.438
Aspiration	139.033	16	" "	0.341
Family Ambition	131.170	12	" "	0.342
Parental pressure	109.667	16	" "	0.306
Total pressure	112.985	16	" "	0.310
English language scale	184.280	12	" "	0.398
Mathematics Scale	29.783	12	0.001 < p < 0.01 (sig.)	0.169
Science Scale	175.478	12	< 0.0001 (extremely sig.)	0.390
Job-Value 2 (Security)	70.820	16	" "	0.280
Job Value 7 (Achievement)	48.474	16	" "	0.208
Job-Value 4 (Altruism)	39.592	16	0.0001 < p < 0.001 (very sig.)	0.188
Job-Value 5 (Monetary)	44.143	16	" "	0.198

Comment : The table shows that many of these variables are highly significant in relationship to the overall grade achieved in L.C.E. It is interesting to note that only four of the ten job values are significantly correlated with L.C.E. grade. This shows that the job-values are mainly conventions, which are widely accepted by most pupils in Malaysia.

TABLE B. CRITERION VARIABLE - NEED-ACHIEVEMENT IDEOLOGY INDEX
AND OTHER PREDICTOR VARIABLES

Predictor variables	χ^2	df.	p	Contingency Coefficient C adjusted
Teacher S.E.S. ratings	92.749	12	<0.0001 (extremely sig.)	0.291
Parents' job	154.484	12	" "	0.318 (unadjusted)
Parent's education	114.714	8	" "	0.278 (unadjusted)
Realism	164.895	16	" "	0.368
Teacher nAch rating	158.377	16	" "	0.362
Total pressure	377.142	16	" "	0.833
English speaking families	126.309	16	" "	0.326
English language scale	283.724	12	" "	0.479
Mathematics scale	36.956	8	" "	0.200
Science attitude scale	98.186	12	" "	0.299
L.C.E. Malay language grade	261.351	16	" "	0.450
L.C.E. English language grade	237.327	16	" "	0.432
L.C.E. History & Geography grades combined	174.749	16	" "	0.378
Job Science scale	39.162	16	0.001 <p< 0.01 (sig.)	0.187
Job need-achievement scale	8.422	16	>0.05 (not sig.)	0.088

Comment: The correlation between total pressure (parental and teacher pressures combined) and need-achievement ideology is extremely high. This shows that, somehow, the learning of the achievement ideology is very closely related to the child-rearing practices of Malaysian parents, the reward and punishment system in Malaysian homes and the pressure imposed on the child in schools.

TABLE C. CRITERION VARIABLE - L.C.E. SCIENCE GRADE AND OTHER PREDICTOR
VARIABLES

Predictor variables	χ^2	df.	p	Contingency Coefficient C adjusted
Teacher S.E.S. ratings	59.864	12	< 0.0001 (extremely sig.)	0.237
Parents' job	135.028	12	" "	0.299 (unadjusted)
Parents' education	107.235	8	" "	0.269 (unadjusted)
Ambition	281.119	16	" "	0.463
Realism	205.132	16	" "	0.405
Aspiration	141.306	16	" "	0.343
Family ambition	106.948	12	" "	0.311
Need-achievement test	139.283	16	" "	0.341
Parental pressure	75.430	16	" "	0.257
Total pressure	83.552	16	" "	0.269
L.C.E. History & Geography grades combined	1552.564	16	" "	0.819
English scale	171.838	12	" "	0.366
Maths. scale	44.981	12	" "	0.206
Science scale	199.807	12	" "	0.389
L.C.E. Malay language grade	600.711	16	" "	0.620
L.C.E. English language grade	943.141	16	" "	0.717
Job value 2 (Security)	74.582	16	" "	0.255
Job value 5 (Monetary)	53.118	16	" "	0.217
Job value 7 (Achievement)	45.560	16	0.0001 < p < 0.001 (very sig.)	0.202
Job value 8 (Creativity)	19.889	16	0.05 (not sig.)	
Job science scale	31.299	16	0.01 < p < 0.05 (doubtfully sig.)	
Job need-achievement scale	13.386	16	> 0.05 (not sig.)	

Comment: The relationship between success in L.C.E. History and Geography, and success in L.C.E. Science is outstanding. The correlation between L.C.E. English and L.C.E. Science grades is also extremely high. This ^{last result} suggests that the proficiency of English language is of considerable importance to success in L.C.E.

TABLE D. NEED ACHIEVEMENT (ACTUAL STRIVING)
AND L.C.E. GRADES VERSUS NEED-ACHIEVEMENT IDEOLOGY
AND L.C.E. GRADES

PREDICTOR VARIABLE	CRITERION VARIABLE	L.C.E. GRADE ACHIEVED						
		OVERALL GRADE	SCIENCE	MATHE- MATICS	HISTORY	GEOGRAPHY	ENGLISH	MALAY LANGUAGE
Teacher nAch ratings of Pupils' <u>Actual</u> Striving	X^2	561.69	505.96	445.44	491.50	490.15	476.23	359.27
	df	16	16	16	16	16	16	16
	$p <$	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	C*	0.539	0.519	0.495	0.513	0.513	0.507	0.455
nAch Ideology Index	X^2	196.004	169.862	142.283	203.839	167.722	237.327	261.351
	df	16	16	16	16	16	16	16
	$p <$	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	C*	0.354	0.332	0.306	0.359	0.328	0.383	0.400

Comments: Whilst the contingency coefficient does differ from Pearson's r , with a large sample it is reasonable to use it as a fair estimate of r . If therefore C is squared, it will provide a very rough estimate of the contribution of the predictor variables to variance in the criterion variable; in the above cases, the respective contribution of need-achievement (actual striving) and need-achievement (ideology), to variance in the L.C.E. grade and the various L.C.E. subject grades. In this table, the C values show that the contribution of the performance component of need-achievement to variance in L.C.E. grades is certainly much greater than that due to the ideology component. The best predictor variable of success in L.C.E. is therefore the actual striving in need-achievement.

* The C values have not been adjusted.

Results

Section III

TREES OF EDUCATIONAL ADVANTAGE/DISADVANTAGE BASED ON TWO

CRITERION VARIABLES:

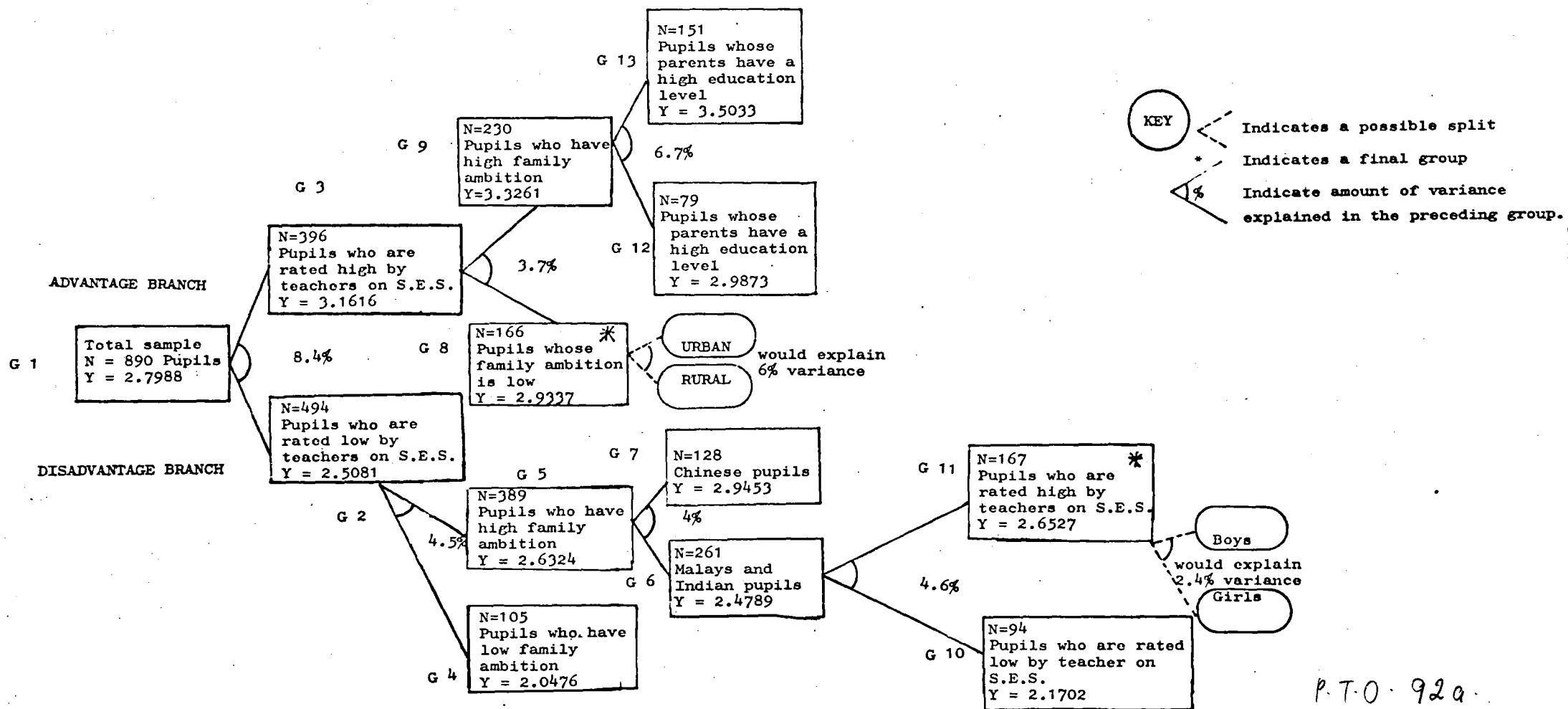
- (1) L.C.E. overall grade
- (2) Teacher need achievement (nAch) ratings
of pupils' actual striving.

(CONTINUED)

TENTATIVE CONCLUSIONS

1. The best predictor variable in accounting for variance in success or failure in L.C.E. is teachers' need-achievement ratings of pupils' actual striving. However one of the problems in AID is when two predictor variables are highly correlated, e.g. "race" and "teachers' nAch ratings of pupils' actual striving", the split caused by one predictor variable may well inhibit a split in the other. Thus, when a split is caused by "teachers' nAch ratings of pupils' actual striving", a great deal of variance in L.C.E. due to "race" may be removed at the same time, so that "race" may not cause the split till later. This means that "race" is involved in the first split, but it is not apparent.
2. It seems conclusive that actual striving is definitely a much more important factor than need-achievement ideology in affecting success or failure in L.C.E., and hence, educational advantage/disadvantage.
3. "Family Ambition" is also an important contributory factor to success in L.C.E., in both the advantage and the disadvantage branches.

CHART II. THE TREE OF EDUCATIONAL ADVANTAGE/DISADVANTAGE, USING TEACHER NEED-ACHIEVEMENT RATINGS OF PUPILS' ACTUAL STRIVING AS A CRITERION VARIABLE



(CONTINUED)

92a.

TENTATIVE CONCLUSIONS

1. Teacher ratings of Pupils' socio-economic status is the best predictor variable in explaining the variance in pupils' actual striving. Socio-economic status is therefore an important contributory factor to producing educational advantage and disadvantage in Malaysia.
2. For pupils in the high socio-economic status group, family ambition and parents' education are important predictor variables. 'Race' does not appear to be interacting with 'Socio-economic status' at all in the advantage branch.
3. In contrast, 'race' is an important predictor variable in the lower socio-economic status groups. This means that pupils who come from lower socio-economic status homes and who are Malays are more likely to show less actual striving, and to become educationally disadvantaged.

CHAPTER VII

CONCLUSIONSGENERALISATION

Before dealing with the conclusion, it is important to consider how far it is reasonable to generalise the findings. The parent population of the sample in this study was from a medium sized town situated close to Kuala Lumpur, the school samples were English medium schools, and although some schools in rural areas were included, these were relatively close to the urban areas and will certainly not be representative of the deep rural areas where there is predominantly a peasant culture. It was a large sample and included a good balance of races and the socio-economic groups.

Thus, it would seem that we may generalise to most towns in Western Malaysia with a fair degree of safety, and to the large metropolitan city of Kuala Lumpur with a certain degree of caution, but because of the development towards technology in Malaysia, there does not appear to be great differences. It is clearly not possible to generalise to the East Coast of Malaysia and to East Malaysia (which includes Sabah and Sarawak) where conditions are different, and although educational disadvantage is very great in rural areas, the overriding factor here is obviously

geographical and no study of this nature has been made.

CONCLUSIONS

It is assumed that learning ability is normally distributed in the population, so that one might then expect equal proportions of all groups to achieve at the various levels in L.C.E. In so far then as the proportion deviates from equal distribution between the groups, one can claim that certain groups are educationally disadvantaged. In particular, if social factors are highly correlated with success or failure in L.C.E., then this is evidence of disadvantage to certain groups.

Initially, some very general questions about educational disadvantage were raised in this thesis. These were refined and converted into hypotheses and these have now been tested and the results reported in the previous chapter. It should now therefore be possible to answer those general questions:

1. Does education disadvantage occur in Malaysia?
2. If so, which groups are most affected?
3. What factors operate to produce educational disadvantage in Malaysia?

The answer to the first question is conclusively "yes". Educational disadvantage is apparent in Malaysia. The groups most affected are the lower socio-economic status groups. This is clearly shown by the results (Page 48,92)

Pupils in the rural schools are also more likely to be disadvantaged. It is interesting to note that, as expected, there was no real difference between the sexes in success in L.C.E. However it was expected that there would be science-disadvantage for girls, but it was not found.

In regard to the third question, many factors are found to relate^{to} success/failure in L.C.E. and have contributed to educational advantage/disadvantage. These are socio-economic status which is a primary factor; family background, proficiency in English language; pressures imposed on the child by the parents at home and the teachers in school; attitude to Science and education in general, and parents' job and education etc. These factors combined in some ways to produce an important mediatory factor - need achievement, which enters into most of the other factors.

The most outstanding confirmation this study has made regards the importance of actual striving in need achievement. It is clear from the results that a mere acceptance of the need-achievement ideology is not sufficient to achieve success in L.C.E. These ideologies must be converted into habits of actual striving to succeed in L.C.E. This is very clearly demonstrated in the finding which shows the Malay pupils have a much stronger acceptance of the need-achievement ideology, then the Chinese, but according to the Teachers' ratings, they did not strive as hard as the Chinese. Thus, in consequence,

the Chinese achieved much better than the Malays in L.C.E., and hence they tend to have more educational advantage than the Malays. It could be that the promise made by the Malaysian Government to facilitate the Malay pupils' entry into higher education, and higher levels of occupation, may well have an adverse effect on the Malay pupils, whose over-reliance on the Government may in fact not encourage them to actually strive.

It is also clear that there is a corresponding correlation between most of the factors, and a high correlation between them is to be expected. It was for this reason that the technique of AID was used, in an attempt to unravel some of these interactions, which are now apparent in the "trees" of educational advantage/disadvantage.

Results from the "trees" show that the most important factor contributing to educational advantage/disadvantage is pupils' actual striving in need achievement, and the most important determinant of which is the socio-economic status of pupils. Because of the interaction between socio-economic status, need achievement (striving) and race, it may be concluded that higher socio-economic status pupils are likely to strive harder, and are more likely to be Chinese. As a corollary, lower socio-economic status pupils are likely to strive less hard, and are more likely to be Malays and Indians. However, 'twigs' in the advantage branch of the tree show that race is not as important a factor in affecting success/failure in L.C.E.

in the higher socio-economic status group, as it is in the lower socio-economic status group and that the main factor is still socio-economic status. Also, while parents' education affects pupils' actual striving in the higher socio-economic status group, it is not a significant factor at all in the lower socio-economic status group.

Clearly, the various possible ways of interaction between variables to produce a collective effect on the criterion variables are important. The nature of their interactions is not at all conclusive at this stage. This would need further research.

IMPLICATIONS

The importance of actual striving in need-achievement is now beyond doubt, as this study has indicated. It is thus hoped, that in a later study, factors which contribute to actual striving in Malaysian children will be examined in detail.

From the practical point of view, it would seem profitable for the Malaysian government to concentrate its efforts on ways of helping Malay pupils to convert achievement ideologies which they have successfully learned, into habits of striving. Over-reliance of the Malay people on the government to assist their entry into higher education and high level occupations seems likely to have

an adverse effect on Malay pupils' actual striving in need achievement and hence, should be deemphasised.

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QUESTIONNAIRE FOR THIRD FORMERS

1st Questionnaire

INSTRUCTIONS

This is an experiment to find out why third formers choose different courses when they go to form four. To find this out, it is necessary to ask some questions about yourself, your school work and your family. There are no correct or wrong answers. We only want those which are true for you yourself, so please answer the questions as honestly as you can. For most of the questions, you just have to tick in the little box against that one answer which is right for you, or to write a few words. In a few questions, you may have to tick more than one part, but you will be told this in those questions.

1. Are you ...

☐

A boy?

☐

A girl?

2. What class are you in? If there are several classes in your form, say exactly which one you are in.

Form 3

3. Is this your first or second year in Form 3?

☐

First year.

☐

Second year.

4. Where did you go for most of your primary education?

☐

Mainly English primary schools.

☐

Mainly Malay primary schools.

☐

Mainly Chinese primary schools.

☐

Mainly Tamil primary schools.

- [illegible]

8. People have many different things in their homes. Which of the things in the following list have you got in your home? For each thing in the list, tick the 'YES' column if you have got it, and the 'NO' column if you haven't got it.

	YES	NO
A bicycle		
A dictionary		
A piano		
A fire-cooking stove		
A television set		
Daily newspaper		
One car only		
More than one car		
Electric light		
Comic magazines		
Serious magazines		
Transistor radio		
Telephone		
Lots of books		
Gas or electric cooking stove		
Camera		

9. How much pocket money are you given on a school day?
(Do not count money given for your bus fare.)

- ☐ 20 ¢ or less.
- ☐ 25 ¢ to 50 ¢
- ☐ 55 ¢ to \$1.00.
- ☐ \$1.05 or more.

10. What work does your father do? If you have not got a father, what work does the person with whom you live and who looks after you do? (Explain carefully in two lines exactly what he does.)
-
-

11. How difficult is it for you to get the money to pay for your education?

- ☐ It is quite easy.
- ☐ It is only a small problem.
- ☐ It is quite difficult.
- ☐ It is very difficult.

12. Can your father or guardian read and write?

- ☐ I have no father or guardian.
- ☐ Yes, he can read and write.
- ☐ He can read but not write.
- ☐ No, he cannot read or write.

13. Can your mother read and write?

- ☐ I have no mother.
- ☐ Yes, she can read and write.
- ☐ She can read but not write.
- ☐ No, she cannot read or write.

14. What is your main ambition when you become grown up?

I would most like to be _____

15. When you finish your education, what sort of a job do you really think you will have? Be as realistic as possible.

I will probably work as a _____

16. (Omit this question if you are a boy)
If you are a girl, would you prefer to get married rather than to have a job?

- ☐ I would prefer to get married.
- ☐ I would prefer to have a job.
- ☐ I would like both.

17. How much education do you want?

- ☐ I don't care.
- ☐ Up to form 3.
- ☐ Probably stop at form 5.
- ☐ Up to form 7 (upper six), if I can.
- ☐ I'd like to aim at a university degree.

18. Which do you think is more important for you?

- ☐ An education in science subjects mainly.
- ☐ An education in other subjects like Arts, Commercial or Technical, etc.

19. Enter the results of your mid-year examination for the following three subjects, and the overall grade in the spaces below.

English language
Science
Maths.
Overall grade

20. On an average weekday, how much time do you spend studying?

- ☐ Little or none.
- ☐ About 1 to 3 hours a day.
- ☐ About 3 to 4 hours a day.
- ☐ About 4 to 5 hours a day.
- ☐ More than 5 hours a day.

21. How many hours do you study in the weekend?

- ☐ Very little or none.
- ☐ A fair amount.
- ☐ A lot.

22. How clever do you think you are compared with your classmates?

- ☐ Among the brightest.
- ☐ Above average.
- ☐ Average.
- ☐ Below average.

23. Do you have private tuition outside school time?

☐ Yes.

☐ No.

24. Below is a list of some school subjects. Look at each subject in turn. If you like the subject very much, put a 4 on the line beside it. If you quite like it, put a 3. If you dislike it a bit, put a 2. If you dislike it very much, put a 1. Do this for each subject in the list.

Malay Language _____

Science _____

English Language _____

Maths. _____

Geography _____

History _____

25. What grade do you think you will probably get for L.C.E. at the end of the year?

☐ Grade 1.

☐ Grade 2.

☐ Grade 3.

☐ Grade 4.

26. If you pass your L.C.E., which of the following courses will you take next year?

☐ Arts.

☐ Science.

☐ Technical or Commercial.

☐ None of the above, as I do not intend to go on to form 4.

27. How good a student does your family want you to be in school?

- ☐ One of the brightest students in my class.
- ☐ Above the middle of my class.
- ☐ In the middle of my class.
- ☐ Just good enough to get by.
- ☐ They don't care.

28. How good a student do you yourself want to be in school?

- ☐ One of the best students in my class.
- ☐ Above the middle of my class.
- ☐ In the middle of my class.
- ☐ Just good enough to get by.
- ☐ I don't care.

29. How good a student does your teacher expect you to be in school?

- ☐ One of the best in my class.
- ☐ Above the middle of my class.
- ☐ In the middle of my class.
- ☐ Just good enough to get by.
- ☐ My teacher does not expect anything much from me.

30. Which type of questions do you like better in any examinations?

- ☐ Essay type questions in which I can express my ideas and my point of view, freely.
- ☐ Objective type questions involving some mathematical calculations or scientific reasoning.
- ☐ Neither, because I am no good in either of them.

31. How difficult do you find it to put down your ideas into words?

- ☐ I find it very hard.
- ☐ I find it quite hard.
- ☐ I find it moderately easy.
- ☐ I find it very easy.

32. How difficult do you find it to put down your ideas into English language?

- ☐ It is easier than solving maths. problems.
- ☐ It is about as difficult as solving maths. problems.
- ☐ It is harder than solving maths. problems.

33. Put ticks beside each of the members in your family who frequently speak English at home.

<input type="checkbox"/>	Father	<input type="checkbox"/>	relatives
<input type="checkbox"/>	Mother	<input type="checkbox"/>	none speak English.
<input type="checkbox"/>	Brother(s) or sister(s)		

34. Do you have problems talking with your parents or any other older members of your family on matters like your interests, your ambitions or other school matters?

☐ No, we can easily talk to each other about such things.

☐ Sometimes it's easy, sometimes it's hard.

☐ Yes, it is always rather difficult to talk to them about such matters.

- * 35. Who will decide the course (e.g. Science, Arts, Technical, Commercial etc.) which you will take next year in school?

☐ Myself.

☐ My parents only.

☐ Both my parents and me.

☐ My teachers.

☐ Nobody, as I shall not go on to form 4.

* This question has been dropped because the decision to pursue either a science or a non-science course is dependent primarily on the L.C.E. grade achieved.

36. Which of the following things would make your parents most disappointed with you?

- ☐ Cheating in class.
- ☐ Telling lies.
- ☐ Failing my L.C.E. at the end of this year.
- ☐ Misbehaving in school.
- ☐ Being disobedient to my parents.

37. Which of the following would make your parents very pleased with you?

- ☐ Doing well at sports.
- ☐ Always giving a helping hand at home.
- ☐ Being elected as class monitor or school prefect.
- ☐ Being top of the class at school.
- ☐ Always behaving well in school.

38. If you did very well in school, what would your parents do?

- ☐ They would reward me handsomely.
- ☐ They would reward me moderately.
- ☐ They would not reward me because they always expect me to do well.
- ☐ They would not be interested.

39. If you did very badly in your school examinations, what would your parents do?

☐

They would punish me severely.

☐

They would punish me moderately.

☐

They would not punish me but would tell me to study harder.

☐

They would not be interested at all.

40. If you pretended sick one day to avoid a class test, what would your mother do?

☐

She would force me to go to school.

☐

She would probably scold me, but would not force me to go to school.

☐

I don't think she would do anything.

THANK YOU VERY MUCH FOR YOUR HELP.

SECOND QUESTIONNAIRE FOR THIRD FORMERS

SECTION I

In this section are some sentences about choosing a job. People choose jobs for all sorts of different reasons. One person may choose his job because the pay is very good, though the work itself may be very unpleasant. For this person, the money is most important. Another person may choose a job with a low pay because his friends work there. For this person money is not as important as his friends. Everybody has different preferences. We would like to know what you would prefer in a job when you grow up, and what you think doesn't matter about the job.

Read each of these sentences carefully, then if you think what it says is the most important thing about a job for you, put the figure 4 in the box beside the sentence. If you think what it says is not the most important thing, but it still matters a lot, put figure 3 in the box. If you think it matters only an average amount, put 2 in the box. If it matters a little bit only, put 1 in the box. If it doesn't matter to you at all, put 0 in the box.

There are no right or wrong answers, only what is true for you. Remember:

Put 4 in the box if it matters very much for you.
 Put 3 in the box if it matters quite a lot.
 Put 2 in the box if it matters an average amount.
 Put 1 in the box if it matters only a little bit.
 Put 0 in the box if it doesn't matter at all.

If you want to change your mind, cross out your first answer and put the new number beside the box like this

☒ 2

Here are the sentences which you have to decide about:

1. ☐ A job in which you can feel important in the eyes of other people.
2. ☐ A job in which you are not likely to be sacked.
3. ☐ A job in which you are the boss.
4. ☐ A job where you are always helping others.
5. ☐ A job where you can earn plenty of money.

6. ☐ A job in which you work with all your friends.
7. ☐ A job in which you could always do your best.
8. ☐ A job in which you don't have to stick to old ideas.
9. ☐ A job in which you have to keep solving new problems.
10. ☐ A job where you are free to do what you want.
11. ☐ A job which makes all your friends think you are an important person.
12. ☐ A job where you know you will never be out of work.
13. ☐ A job in which you tell other people what to do.
14. ☐ A job in which you can help people who need your help.
15. ☐ A job where you can earn much more money as you get older.
16. ☐ A job where other workers are friendly.
17. ☐ A job in which you can see you have done good work.
18. ☐ A job in which you invent new ideas.
19. ☐ A job in which you have to do a lot of hard thinking.
20. ☐ A job where no one tells you what to do.
21. ☐ A job where other people look up to you.

22. ☐ A job where you know you won't have to worry about losing it.
23. ☐ A job where you are in charge of others.
24. ☐ A job where you could do something good for other people.
25. ☐ A job with a big salary that will make you wealthy.
26. ☐ A job where you can talk with lots of people.
27. ☐ A job where you can be proud of what you have done.
28. ☐ A job in which you have to think of new ideas all the time.
29. ☐ A job where you need to be very clever.
30. ☐ A job where you decide what to do and when to do it.

PLEASE TURN OVER

SECTION II

In this section are some questions about life. There are no right or wrong answers, but some will be true for you and some will not be true. Read each sentence in turn. If it is true for you, put a figure 1 in the box next to it; if it is not true for you, put a 0 in the box.

1. ☐ Good luck is more important than hard work for success.
2. ☐ The tougher the job, the harder I work.
3. ☐ It is silly to spend too long in any work, even if it is important.
4. ☐ Even if I can't be certain that I can do something, I would still give it a try.
5. ☐ I wouldn't give up everything I enjoy now, just to become well-off later in my life.
6. ☐ Our future is already determined by fate, and there is nothing we can do about it.
7. ☐ Nothing is impossible if I try hard enough.
8. ☐ No matter how difficult things seem, I will never give up trying.
9. ☐ I wouldn't take any risks if there was any chance that I might fail.
10. ☐ I would prefer to study for many more years at school for a good job, rather than leave at age sixteen for an ordinary job.

Thank you very much for your help.

APPENDIX II

A Description of the Algorithm used in AID

1. The total input sample is considered the first (and indeed only) group at the start.
2. Select that unsplit sample group, group i , which has the largest total sum of squares

$$TSS_i = \sum_{\alpha=1}^{N_i} Y^2 - \frac{\left(\sum_{\alpha=1}^{N_i} Y_{\alpha} \right)^2}{N_i} \quad (1.3.1)$$

such that for the i 'th group

$$TSS_i \geq R (TSS_T) \quad \text{and} \quad N_i \geq M \quad (1.3.2)$$

where R is an arbitrary parameter (normally $.01 \leq R \leq .10$)
and M is an arbitrary integer (normally $20 \leq M \leq 40$).

The requirement (1.3.2) is made to prevent groups with little variation in them, or small numbers of observations, or both, from being split. That group with the largest total sum of squares (around its own mean) is selected, provided that this quantity is larger than a specified fraction of the original total sum of squares (around the grand mean), and that this group contains more than some minimum number of cases (so that any further splits will be credible and have some sampling stability as well as reducing the error variance in the sample).

3. Find the division of the C_k classes of any single predictor X_k such that combining classes to form the partition p of this group i into two nonoverlapping subgroups on this basis provides the largest reduction in the unexplained sum of squares. Thus, choose a partition so as to maximize the expression

$$(n_1 \bar{y}_1^2 + n_2 \bar{y}_2^2) - N_i \bar{y}_i^2 = BSS_{ikp} \quad (1.2.3)$$

where $N_i = n_1 + n_2$

and $\bar{y}_i = \frac{n_1 \bar{y}_1 + n_2 \bar{y}_2}{N_i}$

Source: Sonquist, J.A. and James N. Morgan. The Detection of Interaction Effects. Houghton Mifflin Company U.S.A. 1970. pp.5-6.

for group i over all possible binary splits on all predictors, with restrictions that (a) the classes of each predictor are ordered into descending sequence, using their means as a key and (b) observations belonging to classes which are not contiguous (after sorting) are not placed together in one of the new groups to be formed. Restriction (a) may be removed, by option, for any predictor X_k .

4. For a partition p on variable k over group i to take place after the completion of step 3, it is required that

$$BSS_{ikp} \geq Q(TSS_T) \quad (1.3.4)$$

where Q is an arbitrary parameter in the range $.001 \leq Q < R$, and TSS_T is the total sum of squares for the input sample.

Otherwise group i is not capable of being split; that is, no variable is "useful" in reducing the predictive error in this group. The next most promising group ($TSS_j = \text{maximum}$) is selected via step 2 and step 3 is then applied to it, etc.

5. If there are no more unsplit groups such that requirement (1.3.2) is met, or if, for those groups meeting it, requirement (1.3.4) is not met (i.e., there is no "useful" predictor), or if the number of currently unsplit groups exceeds a specified input parameter, the process terminates.

APPENDIX III
REGULATIONS
for the
LOWER CERTIFICATE OF EDUCATION
EXAMINATION 1974
MINISTRY OF EDUCATION MALAYSIA

N.B. *New regulations are side-lined for emphasis.*

SECTION I – ACCEPTANCE OF CANDIDATES
FOR THE EXAMINATION

This examination will be open to the following categories of candidates:—

1. (a) Pupils in Form III of all Assisted Secondary Schools.
- (b) Pupils in Form III or above of Private Secondary Schools (Malay or English Medium).
- (c) Pupils in Form III or above of Private Secondary Schools where the medium of instruction is other than Malay or English, with an extra year of special language instruction in preparation for the appropriate language version of the L.C.E. Examination.
2. (i) Private individual candidates may be accepted under one of the following conditions:—
 - (a) Applicants who can offer authentic proof of having completed the first three years of study in a registered secondary school (Malay or English) of which one year should have been in Form III. A valid leaving school certificate or a statement from the principal of the school must be produced as evidence.

b.

OR

- (b) Applicants who are following or have followed an accepted course of instruction at a correspondence school or college and, in the opinion of the Director of Education concerned, have attained a standard equivalent to Form III of an assisted school or those who are in Form III at a Government Further Education Class.

OR

- (c) Applicants who have followed an acceptable Secondary School Course outside the States of West Malaysia. "An Acceptable Secondary School Course" refers to that which is of a standard equivalent to that of Form III of an assisted school in the States of West Malaysia.
- (ii) Applicants with qualifications which do not fall within any of the above categories as mentioned in para 2(i) will not normally be accepted for the examination but if Director of Education have received any application that merits special consideration it should be forwarded to the Examination Syndicate with their recommendations.

3. Any person who is not entered for the Full Certificate may enter for one or more of the following Single Language Subjects:—

- (a) *Bahasa Malaysia
- (b) English II
- (c) Chinese
- (d) Tamil
- (e) Arabic
- (f) Punjabi
- (g) Telugu
- (h) French

(See Section II, 14 on Other Language Subjects)

***IMPORTANT**

- (i) Candidates offering Bahasa Malaysia must sit for a compulsory Oral Malay Test.
 - (ii) However, candidates who have already sat for the full certificate of the Sijil Rendah Pelajaran examination (Malay Medium) in 1973 or earlier will not be required to take the oral test in Bahasa Malaysia when they enter for Bahasa Malaysia as a single language subject.
4. There is no age limit for candidates taking this examination.
5. The examination fee will be as follows:—
- (a) Full Certificate - \$15/- per candidate.
 - (b) Each Single Language Subject - \$3/-.
 - (c) An extra fee of 50 cents for the practical examination, in Music.
6. Checking of Entries.
- (a) It is important that all particulars given on the entry forms should be accurate and properly checked.
 - (b) Heads of schools should see that the names of the candidates are as those in their birth certificates or other accepted documents of birth. They should also verify that these names are the same as those appearing in their Identity Cards and, if they are different, the candidates concerned should be advised to make a Statutory Declaration.
 - (c) Each candidate should carefully check his/her entries and correctness of name before initialling on the entry forms.

Notes: Candidates will normally be allowed to sit only for those papers for which they are shown as entered.

b

Exceptionally, a candidate who claims to have entered for a paper for which he is not shown as entered may be allowed to take it 'under protest' subject to the special conditions governing such cases.

SECTION II – SUBJECTS FOR THE EXAMINATION

Important

- (i) All candidates sitting for the full Certificate in the Lower Certificate of Education Examination (English Medium) must sit for a compulsory Oral Malay Test.
- (ii) Candidates sitting for the full Certificate in the Lower Certificate of Education Examination (English Medium) will not be required to sit for the Oral English Test.
- || (iii) As from 1974, the subjects LUKISAN (ART) and PENGETAHUAN UGAMA ISLAM (RELIGIOUS KNOWLEDGE-ISLAMIC) will be offerable only IN THE MEDIUM OF Bahasa Malaysia. ||

Candidates may enter for a total of not fewer than 6 and not more than 8 subjects. (See Compulsory subjects below and also Sections III and IV for Choice of Subjects and Conditions of Award in pages 8 to 11).

Candidates will not be allowed to offer supplementary subjects except for Single Language Subjects.

There will be no exemption from part or whole of the examination except in the practical examination in Music. Prior approval for this must be obtained from the Director of Examinations.

The Subjects are grouped as follows:—

Compulsory Subjects

1. Bahasa Malaysia
2. English I (No standard above pass is awarded)

OR English II (Any candidate who sits for English II but fails in the paper may be considered for the award of a pass in English I).

General Subjects

3. History
4. Geography
- || 5. Pengetahuan Ugama Islam (offerable only in the medium of Bahasa Malaysia) ||
6. (a) Religious Knowledge (Christian) Knox.
(b) Religious Knowledge (Christian) Revised/New English Bible.
7. Other religious subjects for which two years' prior notice must be given.

Languages

8. Arabic
9. Chinese
10. Tamil
11. Punjabi
12. Telugu
13. French
14. Other Language Subjects e.g. German, Thai or Japanese for which two years' prior notice must be given.

b

Mathematics, Science and Other Subjects

- 15a. Mathematics (May not be taken with Modern Mathematics).
- +15b. Modern Mathematics (May not be taken with Mathematics).
- 16a. Science (May not be taken with Integrated Science).
- +16b. Integrated Science (May not be taken with Science).
- 17a. Agricultural Science (May not be taken with Agricultural Science Alternative).
- +17b. Agricultural Science Alternative (May not be taken with Agricultural Science).
- 18. Home Science.
- 19. Industrial Arts
- 20. Commercial Studies
- 21. Technical Drawing
- || 22. Lukisan (offerable only in the medium of Bahasa Malaysia) ||
- 23. Music.

- + (i) Only schools offering courses in this subject may present candidates for it.
- (ii) Only those candidates who offered this subject in 1973 or earlier may re-enter for it in 1974

Notes:—

- (a) Subjects in which coursework marks are required:—
Home Science
Industrial Arts

i) **Private Individual Candidates** cannot be accepted for the above subjects mentioned in note (a) unless they had entered and been accepted for the subjects in the Lower Certificate of Education Examination 1973, on the basis of the required coursework marks. Coursework marks obtained in 1973 will be valid only for 1974 and 1975, and candidates in this category are required to give the following details of candidature as prescribed in the Entry Form:-

Year of Examination.....

Name of Examination Centre.....

Index No.....

ii) **Candidates from Private Schools/Institutions and Further Education Classes** may offer the above subjects provided, in the opinion of the Director of Education of the State concerned, the School is suitably equipped for the teaching of the subjects, otherwise the candidates are required to satisfy the conditions as laid down for Private Individual Candidates in Note (a) (i).

iii) **Private Individual Candidates** who took the subjects in 1972, however, may be accepted for the same subjects in 1974 only. Such candidates will also require to supply details of Candidature as in (a) (i).

||(b) **Pertukangan Tangan dalam matapelajaran Lukisan.**||

(i) **Candidates from Private School/Institutions and Further Education Classes** may offer the Pertukangan Tangan dalam matapelajaran Lukisan the opinion of the Director of Education the school is suitably equipped for the proper teaching of the subject.

b

- (ii) Private individual candidates will not be allowed to offer Pertukangan Tangan dalam matapelajaran Lukisan.

Subject Codes

Each subject is assigned a number code. The codes are as follows:--

Subject	Subject Code Number
Bahasa Malaysia	02
English I	11
English II	12
History	21
Geography	23
Arabic	31
Chinese	32
Tamil	33
Punjabi	34
Telugu	35
French	36
Religious Knowledge (Islamic)	41
Religious Knowledge (Christian) Knox	42
Religious Knowledge (Christian)	
Revised/New English Bible	43
Modern Mathematics	50
Mathematics	51
Commercial Studies	52
Music	53
Science	54
Integrated Science	55
Agricultural Science	62
Agricultural Science Alternative	63
Home Science	72
Technical Drawing	80
Industrial Arts	82
Lukisan I (Gubahan Fikiran) dan	
Lukisan II (Gubahan)	91
Lukisan I (Gubahan Fikiran) dan	
Lukisan II (Pertukangan Tangan)	92

SECTION III – SPECIAL INSTRUCTIONS REGARDING THE CHOICE OF SUBJECTS.

Bahasa Malaysia.

All candidates must enter and sit for Bahasa Malaysia.

2. English I.

- (a) A candidate who enters and sits for English II but fails in this paper may be considered for the award for a pass in English I.
- (b) No grading higher than 'Pass', i.e. Grade 7, will be awarded for English I.

3. || Lukisan ||

There will be two papers – Lukisan I (Gubahan Fikiran dan Lukisan II (Gubahan) Pertukangan Tangan may be offered in lieu of Gubahan provided the specimens are made by the candidates themselves, and are so certified jointly by their school principal and teacher-in-charge of Lukisan.

SECTION IV – CONDITIONS OF AWARD

IMPORTANT

To Qualify for the award of a certificate a candidate must have appeared for the compulsory Oral Malay Test.

The same condition applies to the award of a statement for candidates offering Bahasa Malaysia as a single subject.

This condition however does not apply to candidates who have previously sat for the Sijil Rendah Pelajaran (Malay Medium) examination.

- 1. The following grades will be used to denote the standard of achievement in the subjects:—

b

Grade	Meaning
1 } 2 }	Very Good
3 } 4 } 5 } 6 }	Credit
7 } 8 }	Pass
9	Fail

2. Subject requirements for Upper Secondary Education.

For promotion to Form Four of a Secondary School candidates must satisfy the conditions (a), (b) and (c) below:—

- (a) Obtain a 'Pass' in
- (i) Bahasa Malaysia,
 - and (ii) English II,
 - and (iii) Mathematics/Modern Mathematics,
 - and (iv) History or Geography;

and (b) Obtain a 'Pass' in one of the following subjects:—

- (i) Science/Integrated Science,
- (ii) Industrial Arts,
- (iii) Agricultural Science/
Agricultural Science
Alternative,

- (iv) Commercial Studies,
- (v) Home Science;

and (c) Obtain an aggregate of subject grades not exceeding 34 units made up of 5 best subjects as follows:—

- (i) Three subjects in para 2(a),
- (ii) One subject from 2(b)
- (iii) Any one of the remaining subjects offered.

The conditions stated above apply only to results obtained in one and the same examination.

3. Concession for Promotion.

The qualifying condition of 'Pass' in English II may be reduced to 'Pass' in English I supported by a 'Credit' in Bahasa Malaysia or a 'Credit' in any other language, but the candidates must sit for English II to get a 'Pass' in English I.

4. Award of Certificates and Statements for Full Certificate Entries.

- (a) A certificate will be awarded to any candidate who:—

Either	(i)	satisfies conditions 2(a), 2(b) and 2(c),
OR	(ii)	satisfies conditions 2(a) and 2(b),
OR	(iii)	satisfies condition 2(a) and obtains a total of at least five passes;

- (b) All other candidates will be awarded statements if they pass in at least one subject;

- (c) Only the subjects passed will be shown on the certificate. The standard of achievement in each subject, i.e. Grade 1–8 will also be shown and the description 'Very Good', or 'Credit' or 'Pass' printed after each grade;

b

(d) Three grades of certificates will be issued:—

- (i) **Grade A** — To candidates who have satisfied the conditions for promotion in para 2(a), 2(b) and 2(c) above. These candidates are eligible for consideration for promotion to Form Four of secondary schools and for exemption from Qualifying Test;
- (ii) **Grade B** — To candidates who have satisfied the conditions for promotion under para 2(a) and 2(b), but have not satisfied the condition under para 2(c) above;
- (iii) **Grade C** — To candidates who have satisfied only condition 2(a) and have obtained a total of at least five passes.

Candidates who obtain a Grade B or Grade C award will not qualify for consideration for promotion to Form IV of a secondary academic school. Grade B and Grade C candidates, however, will be exempted from the Qualifying Test to sit for the Malaysia Certificate of Education/Sijil Pelajaran Malaysia examination.

5. Award of Statements for Single Language Entries.

Statements will be issued to candidates who pass in Single Language Subjects.

SECTION V — GENERAL ARRANGEMENTS

1. Date of Examination.

The examination each year will be held during the month of October (Dates and times will be announced later in the year). Oral Malay and Oral English Tests will be held in June. Practical Examination in Music will be held in September.